REPORT

ON

INDUSTRIAL INSTRUCT.

TO THE COUNCIL OF THE SOCIETY OF ARTS.

Society of Arts, Manufactures, and Commerce,
Adelphi, London, April 26, 1853.

GENTLEMEN,

Appointment of Committee.

AT an Ordinary Meeting of the Council of the Society of Arts, held on Wednesday the 19th of January last, the following minute was passed:—

Resolved,—To appoint a Committee, to take into consideration, and to report how far and in what manner, the Society of Arts may aid in the promotion of such an education of the people as shall lead to a more general and systematic cultivation of arts, manufactures, and commerce—the chartered objects of the Society.

Resolved,—That the Committee do consist of the following members of Council: The Rev. Dr. Booth, Mr. Bell, Mr. Le Neve Foster, and Mr. Twining.

Your Committee—having carefully examined the questions submitted to them, having deliberately analyzed and weighed the large mass of evidence which they have had the honour to receive from endowed grammar schools, from private schools, from mechanics' institutions, from the friends of education of every grade, and especially from a considerable number of the leading manufacturers of the country; having considered the objections by which any proposal for a change in the existing state of things is usually met,—agreed to, and beg now to submit this their Report.

The Society of Arts long ... took ... the ...

We must premise the observation, that an interest in the improvement of education is by no means a novel feature in the ... of our Society. This, the following extract from the ... our Transactions for the year 1787, will show:—

> 1783, *the Society, considering the education of youth a matter importance, and reflecting on the great length of time usually ...e study of languages, offered the following premiums:*—*
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> ... the Masters of Academies or Schools teaching Languages.
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> ...ereas it has been observed that the living languages, or languages ... in schools, are much sooner acquired than the dead languages, which ...only taught grammatically:
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> "The Society, desirous to improve the present mode of education, hereby offers the gold medal to the master of any academy or school for boys, situated within or not more than thirty miles distant from London, who shall, within three years from the date of this advertisement, teach the greatest number of scholars, not less than four, to write and to speak Latin in common conversation correctly and fluently.
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> "Also, the gold medal for teaching in like manner each of the following languages, viz., the German, the Spanish, and the Italian, being commercial languages not usually taught at schools in England.
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> "The masters who propose being candidates for the above premiums are to send notice of their intention to claim them, at the Society's house in the Adelphi, on or before the second Tuesday in November 1786; soon after which the Society will appoint a day for examining the young gentlemen, and for adjudging the said claims."

First proceeding of Committee.

At the first meeting of the Committee, we took into our careful consideration the steps which, in the discharge of the duties imposed on us, it would be proper to take. We were of opinion, that our first proceeding should be, to ascertain, with as much accuracy as we could, the sentiments of manufacturers themselves upon the question of an improved industrial instruction. We adopted this course the more readily, as we knew it to be the earnest desire of the Council of the Society of Arts to learn, by independent inquiry, how far an improved education was really felt as a want by that class which is most interested in the question. We were convinced, that however clearly mere abstract reasoning might show to those who had investigated the subject the reality of the want; still, if those experienced judges, the manufacturers, had no perception of such a need, it would be useless, with reference to a practical result, to urge the inquiry further, however interesting such an investigation might be, as likely to throw light on a great social problem. Accordingly, we drew up a circular letter, and sent it to many of the principal manufacturers, in which they were invited to consider the subject, and to communicate

They issue a circular letter to manufacturers.

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* Transactions of the Society of Arts, Manufactures, and Commerce, vol. v. p. 111.

their views to the Committee. It is proper to mention, that we made no previous inquiry as to the opinions held on this matter by those persons whom we had the honour to address. Our object was to obtain, if possible, a fair exposition of manufacturing opinion. A copy of the circular letter we here subjoin.

"Society of Arts, Manufactures, and Commerce,
"SIR, Adelphi, London, Jan. 31, 1853.

"I AM desired by the Industrial Instruction Committee of the Council of the Society of Arts, to draw your attention to the feeling so generally manifested for improving the character of the instruction of the industrial classes.

"It seems to be obvious that the increased facilities for the communication both of material and thought, have rendered production more dependent on the resources of applied science than it formerly was; while the more general cultivation of taste has led to a demand for a higher artistic development of form as applied to manufactures. The triumphs of manufacturing skill in modern times are chiefly connected with mechanical inventions, or with discoveries in chemical and physical science; and industrial competition has resolved itself into a competition of intellect, rather than that of the cost of unskilled labour, or the accidental indigenous possession of the raw material.

"While science has effected this silent revolution in production, our institutions for special education have not expanded themselves so as to teach the principles upon which manufacturing processes depend.

"It is therefore necessary that the preliminary technical education of the industrial classes should be more suited to the realities of life and to the requirements of modern industry. By industrial instruction is not meant a system which would substitute the school for the workshop, or the college for the factory; nor is it for a moment contemplated to substitute scholastic learning for the practical training of an apprenticeship; but it is obvious that the latter might be made more efficacious and its acquisition more easy if the apprentice-pupil had previously learned the *principles* of art and science upon which his industry depends. It would be absurd, for example, to suppose that any school could turn out a pupil a ready-formed machine-maker; yet the labour of the mechanical engineer in giving practical instruction to his apprentice would be not only lightened, but be made more efficient, if the latter had been previously taught mechanical drawing, had learned the properties of the lever, the pulley, and the wedge, and knew the nature of and the differences between cast iron, wrought iron, and steel. While, therefore, the practical training would be left as heretofore, it cannot be denied that a knowledge of the principles of the sciences on which arts or trades are founded, is an indispensable element in the instruction of well-skilled workmen.

"The Committee would remark, that the other great producing States of Europe now act upon this conviction, and have founded industrial schools and colleges for the preliminary instruction of their producers, the pupils being in great demand by manufacturers.

"Among the suggestions which the Committee would throw out for your consideration, and on which your opinion is respectfully desired, are the following, which embody, at least virtually, some of the great principles to be recognized in any national system of industrial instruction:—

"I. The improvement of the endowed grammar schools, more especially of those which are not intimately connected with the universities; and their enlargement so as to introduce among the subjects taught the elements of industrial instruction.

"II. The conversion of the present mechanics' institutions, where practicable, into systematic industrial schools for artizans.

"III. The establishment of a higher class of schools for those who are likely to have charge of manufacturing establishments.

"IV. That aid, in the first instance at least, should be afforded by supplying, at a reduced cost, books, maps and models, diagrams and apparatus.

"V. That systematic and defined courses of study be recommended.

"VI. That something in the nature of a system of prizes, exhibitions, or scholarships be provided. Innumerable rewards exist at present for the cultivation of classical learning; why should there not be some for the promotion of industrial knowledge?

"Numerous memorials, urging an improvement in industrial instruction, have been signed by the leading men of the chief manufacturing towns of this country, and in consequence of these, it is obvious that great efforts will soon be made to introduce, on a national scale, improvements in the very imperfect modes now existing for obtaining industrial instruction. But it is most important that any changes or additions authoritatively suggested should be in accordance with the convictions of the manufacturers themselves; and it is with this view that we would desire to draw your general attention to the subject, keeping in view that the character of instruction given to the working artisan may be different in kind and degree from that necessary for the manufacturer, who has to take general charge of an extensive factory.

"We trust that you will favour the Committee with your views on these subjects, for their consideration, as they are drawing up a report embracing as fully as possible the evidence received by them; for while they believe the great want of our time to be a thorough system of industrial instruction, in connexion with the practical training in the workshops of industry, they are convinced that this can only be effectually carried out with the full concurrence, sympathy, and support of those industrial populations for whose benefit it is intended.

"As Parliament will meet after the recess on the 10th of February, I shall feel obliged if you will favour me with a reply, at your *earliest convenience*, and, if possible, before that date.

"By order of the Committee,
"EDWARD SOLLY."

In reply to this circular we have received several important communications, and from some of the most influential and enlightened manufacturers of the country. We shall here give brief extracts from their letters to the Committee. The letters will be found in Appendix A.

Extracts from the answers to this circular.

Mr. A. Aitkin, chief designer, &c. to Messrs. Winfield, of Birmingham, says,—

"I have, therefore, much satisfaction in recording my opinion in favour of the movement. At the same time permit me to add, that my conviction has been strengthened by fourteen years experience and intercourse with the class it is more particularly intended should be benefited by the introduction of a course of technical education."

M. Arnoux, an eminent designer, employed in the Staffordshire Potteries, gives his most cordial assent to the principles

developed in the circular. We beg to refer to his letter, which will not admit of abridgement.

Mr. Richard Atkinson, of Dublin, an eminent poplin manufacturer, thus expresses his approval,—

"With respect to the suggestions, I think them most admirable, and, as a manufacturer of nearly forty years standing, can bear testimony to the great advantage of having intelligent and skilled workmen; and even were that the only advantage, it would be great, but now that other countries are applying their energies to further manufactures, and that every new application of an element is followed by its adaptation to manufactures, it is absolutely necessary that the youth of these countries should be educated in those industrial pursuits, so as not to be behind any other country, and also to be able to apprehend and apply the various discoveries made in science to manufacturing purposes."

Messrs. Broadhead and Atkin, of Sheffield, write,—

"The objects and suggestions which the Committee have in view, as stated in the circular, we believe to be of the most weighty import, and likely to be productive of great good if carried out."

Messrs. Castles and Co., of Bristol,—

"Highly approve of the general views of the Society of Arts in respect to the education of the working classes. It would be highly desirable in our grammar and city schools to have a class for giving industrial instruction."

Mr. W. Charley, of Seymour-hill, near Belfast, an eminent linen-bleacher, thus gives his opinion,—

"I, for one, have long felt the necessity, in the linen manufacture of the north of Ireland, for some such step; knowing, as I do, the frequent loss occasioned in many of its branches by the ignorance of the persons in charge."

Mr. Walter Crum, F.R.S., of Thornliebank, near Glasgow,—

"Has always advocated the dissemination of the principles of art and science among the people, and has taken some share in the promotion of that object, and is thoroughly convinced of its importance. He is satisfied that voluntary exertions will not effect it; for the people themselves will not pay for an expensive education where value is to them but distantly prospective, and it is vain to expect that private individuals in a community will continue for any length of time to subscribe money to provide it for them. If it is to be effected then, it must be done by Government or some such power.

Mr. Felkin, late mayor of Nottingham, says,—

"I agree in the fact, as stated in the circular, that education should include industrial knowledge, so far as concerns principles, and the mode of working them out in practice, and also storing the mind with important facts; and that our grammar and proprietary schools may well be made accessories to this end. The time has arrived for improvement in these institutions."

Mr. William Fairbairn, F.R.S., of Manchester, the eminent engineer, says,—

"That a better and more efficient system of elementary instruction should be adopted does not admit of doubt; and the want of such a system is equally apparent to all those who have watched the progress of the mechanical and industrial arts since the introduction of the steam-engine, and the peace

of 1815. From that period it is obvious that the unprecedented increase of manufactures, the numerous mechanical inventions, the introduction of steam navigation, and the crowning discoveries of the electric telegraph and locomotion by steam, are in themselves sufficient inducement to urge the necessity of that preliminary instruction anticipated by the Committee, and so much in demand by those who are the sinews of our national ascendancy, and the true supporters of our national wealth."

Mr. Richard Fort, of Read Hall, thus states his views,—

"I think the wants of the age require educational establishments in great manufacturing centres, devoted to the exclusive teaching of those branches of natural science most intimately connected with the great branches of national industry. . . . Were they established in this spirit, and did they confine themselves in *proper humility* to teaching the principles merely, and *scientifically known* facts of the trades they referred to, I cannot conceive any one doubting their conduciveness to improvement. But were they to assume presumptuously the office of *special practical* instructors, instead of *special scientific* instructors, nothing but failure would result."

Mr. William Gourlie, of Glasgow, an eminent calico printer, has—

"Had frequent opportunities of coming in contact with artizans (such as engineers, millwrights, calico-printers, &c.) whilst engaged at their work, and is convinced that it is a great advantage to them if they have, in addition to a practical acquaintance with their art, a knowledge of the principles of mechanics, of chemistry, or other sciences connected with their business."

Mr. Harry Green, artist, of Stoke-upon-Trent, in the employment of Mr. Herbert Minton, expresses his conviction that,—

"Too much support, therefore, on the part of manufacturers and the public generally, cannot be given to the members of the Industrial Instruction Committee, and to the Council of the Society of Arts generally, in their praiseworthy endeavours to accomplish so desirable a scheme.

"As regards the recent establishment of elementary drawing schools, as one important step in the right direction, and, independently of being instrumental in diffusing a correct taste, will be highly beneficial in rendering more effective the labours of those who have the direction of our schools of design and other schools of a similar character which may be hereafter established; art, however, and the practical sciences, seem to be so inseparable in their relation to manufacture, that the successful development of industrial art, without a knowledge of the *elementary principles* of those sciences on which its successful application to manufacture depends, seems to be an impossibility."

Messrs. Greenhalgh and Sons, of Mansfield, Notts, say,—

"In allusion to your circular of the 31st, received this morning, we conceive there can be no doubt that a scholastic training for youths intended for the useful arts, would be essentially beneficial if it embraced a knowledge of the elements of science, and of the qualities of natural productions."

Mr. Alexander Harvey, of Glasgow, writes to the Committee,—

"As Mr. Solly's letter embodies almost entirely my views on the above subject, I will merely make a few remarks on the six different suggestions thrown out by the Committee so far as they are applicable to Glasgow. . . . I have only further to express my hope, that the efforts now making to make our schools more efficient and better adapted to the wants of the country may be successful."

Mr. John Hick, of Soho Ironworks, Bolton, thus writes to the Secretary,—

"I quite approve of the object you have in view, and of your suggestions as to the means of its attainment. One immediate advantage, in addition to those you have alluded to, would, I think, result from the system of education now proposed, viz., that a young man desirous of entering any business would have the opportunity of directing his studies and abilities to the branches of art and science more particularly bearing upon his intended occupation, thus developing his suitableness for such employment (or otherwise) before becoming committed to follow it. I have experienced much disappointment in this respect, not only on my own account, but on that of young men who have been almost forced upon me, without any regard to the talent they possessed for mechanical pursuits, but who, having once embarked in them, do not like the odium of withdrawing. I think it would tend greatly to the success of any institution if a measure can be carried out for these purposes on such a scale as to admit of there being different teachers of various branches of instruction, to whose lectures or classes the pupils could have the opportunity of attending, as is pursued in our colleges. It is very desirable that the courses and modes of instruction should be well established and defined or laid down at a normal and central institution in London, to which the different schools can refer, and from which they may procure instructions in the various branches of education desired to be inculcated. The advantages of the division of labour are as palpable in reference to education as to any science or employment."

Messrs. Hill, Evans, and Co., of Worcester,—

"Quite feel the importance of efficient assistance being rendered to the development of industrial education of the character alluded to, and see no better mode of rendering that assistance than in the manner indicated in your circular."

Messrs. Joseph Jubb and Sons, of Battley, near Dewsbury, say,—

"We approve generally of the objects you contemplate, and are quite of opinion that it is now highly necessary that manufacturers, particularly textile, should be conducted and based on scientific principles, which is far from being the case at present."

Mr. John Mercer, of Oakenshaw, F.R.S., an eminent calico-printer, thus states his opinion to the Committee,—

"It appears the time is near at hand when something should be done for the rising generation in a scientific way, more than the common country school supplies, for in every town and village they now have reading-rooms, mutual improvement societies, and little mechanics' institutions."

To the same effect Mr. Herbert Minton, of Stoke-upon-Trent, a well-known manufacturer, says,—

"I most cordially assent to the six propositions made by Professor Solly, and unless something is done to assist the manufacturers of this country in the way of applying science as well as art to our practical knowledge, we shall find, as is clearly stated in Dr. Playfair's excellent pamphlet, that England will be left behind in the race of competition, which is now pressing us hard."

Mr. R. Napier, of Glasgow, in his letter to the Committee, thus expresses his opinion,—

"I consider it one of the greatest importance for the future prosperity of the country; it being my opinion, if we are to maintain the high position we

now hold as a nation, our operatives and artizans, &c., must not only be expert practical men, but, as indicated in the circular, ought to know and understand the principles on which manufacturing processes depend.

"In establishing and carrying out a comprehensive system of industrial education for the nation, I have no doubt many practical difficulties will be met with, and that modifications will require to be made. Still, in so far as I can judge, the plan suggested in this circular appears to meet the wants of the case. In a free country like Great Britain, where any man by talent and persevering industry has it in his power to attain a respectable position in society, I am delighted to find that a movement is making in the right direction to educate and improve the working classes, and thus be the means of elevating the character of the nation as a whole, and also enabling us successfully to compete with other nations in all that is worth competing for."

Messrs. Losh, Williams, and Co., of the Walker ironworks, Newcastle-on-Tyne, say,—

"We cordially concur in the suggestions contained in the circular."

Messrs. Nelson, Knowles, and Co., of Manchester, reply,—

"The suggestions made have our entire approval."

Mr. James Nasmyth, of Patricroft, near Manchester, says,—

"It would be indeed most desirable to establish such higher schools of industrial art and manufacture. It might not be practicable to teach branches of manufacture in such, but simply the principles."

Mr. A. Follett Osler, the well known glass manufacturer at Birmingham, writes to the Committee,—

"Being a sincere advocate of education myself, I shall be much pleased to see all plans carried out which further that object; and I earnestly hope that the efforts of the Committee may be successful."

Mr. H. L. Pattinson, of Newcastle-on-Tyne,—

"Thinks every one of the propositions contained in the circular good, and if acted upon likely to produce the best results."

Mr. J. Russell, of New Hall-street, Birmingham, writes to the Secretary, and says,—

"I assure you of my cordial sympathy in the objects you propose. I fear, however, that I am opposed to the general opinion in desiring to carry out the principle of self-support to the exclusion of all Government aids in educational institutions of the nature you propose, at least to as great an extent as is possible."

Mr. S. Schwabe, calico printer, of Manchester,—

"Would be glad to see some system introduced by which some knowledge of mechanics, and other matters relating to industry, could be imparted to the children frequenting our common schools."

Having thus obtained a decided expression of opinion, on the part of the manufacturers, as to the urgent necessity of industrial instruction, your Committee next proceeded to endeavour to elicit the sentiments of those who had studied the subject of education as a great social question. We felt strongly, that if the results of the knowledge and experience of such men should be freely communicated to us, the value of our Report would

be much enhanced. Accordingly, we issued a second circular letter, somewhat more general than the first, addressed to correspondents of this class. The letter was as follows:—

Circular Letter to the Friends of Education.

"Society of Arts, Manufactures, and Commerce,
Adelphi, London, February 5, 1853.

"SIR,

"I AM instructed by the Committee on Industrial Instruction of the Council of the Society of Arts to direct your attention to the present aspect of the great national question, the education of the people.

"The Committee believe that the present is a time peculiarly auspicious for pressing the settlement of this question on the Government and the Legislature. Many causes conspire to this: the adjustment of those political questions which have engrossed the attention both of the legislature and of the people for the last forty years; the interest which all classes now take in the progress of social reforms; the leisure afforded by peace abroad and profound tranquillity at home; the growing prosperity of the country; the tide of emigration steadily setting in to our colonies; these, and other circumstances of a like tendency, point to the present as a most favourable juncture to press for a satisfactory arrangement of this great question.

"The Committee, taking up that portion of the subject which lies more immediately within their province—Industrial Instruction as a means of promoting Arts, Manufactures, and Commerce, the chartered objects of their Society—only give expression to a widely-spread opinion—an opinion which has now deepened into conviction, since the products of the industry of the nations of the earth were brought into emulative comparison at the Great Exhibition of 1851,—that industrial instruction, and a suitable training bearing on the realities of life, and fitted to the wants of the times, are the pressing needs of our day. They are needs which the improvement of our ancient educational foundations, and the adaptation of existing institutions, might be made in a great degree to supply. Little of solid advantage is now to be derived from those ample funds which the munificence and the sagacity of our forefathers in no stinted measure appropriated, under the name of free grammar schools, for the teaching of the elements of the only knowledge then in being—a munificence and sagacity which their descendants on the other side of the Atlantic have justly appreciated in founding schools in which the modern requirements of society are amply provided for. They have profited by the example. With us the teaching has remained nearly stationary, while our knowledge has been almost infinitely augmented.

"The Committee believe that the great want of our time is a thorough system of industrial instruction. On this point they would desire to remove an erroneous impression very generally entertained. By industrial instruction they do not mean to indicate a system which would substitute the school for the workshop, or the college for the factory. They would never accept attendance at a lecture session in lieu of an apprenticeship. They believe that the practice of an art, or the manipulations of a trade, are best learned as realities, as the stated occupations of everyday life. But they are equally convinced that a knowledge of the principles of the sciences on which arts or trades are founded, is an indispensable element in the instruction of the well-skilled workman. It cannot be denied, that a knowledge of the principles of drawing must be useful to the draughtsman, or that a familiarity with the properties of the lever assist the engineer.

"Among the suggestions the Committee would throw out for your consideration, and on which your opinion is respectfully desired, they would indicate the following, as embodying, at least virtually, some of the great principles which ought to be recognized, in any national system of industrial instruction:

"I. The improvement of the endowed grammar schools, more especially of those which are not intimately connected with the universities; to enlarge them, so as to introduce among the subjects taught the elements of industrial instruction.

"II. The conversion of the present mechanics' institutions, where practicable, into industrial colleges.

"III. The introduction into proprietary schools and colleges of a system of instruction better suited to the wants of the middle classes.

"IV. That aid, in the first instance at least, should be afforded by supplying, at a reduced cost, maps and models, diagrams and apparatus.

"V. That systematic and defined courses of study be recommended.

"VI. That something in the nature of a system of prizes, exhibitions, or scholarships be provided. Innumerable rewards exist at present for the cultivation of classical learning; why should there not be some for the promotion of industrial knowledge?

"VII. To hold public examinations at certain central localities, for the purpose of awarding such prizes.

"VIII. To award to candidates who should distinguish themselves certificates of different degrees of merit. Such certificates, if carefully awarded and after due examination, might be made, as all analogy shows us, of great importance.

"There are, no doubt, other improvements which may be obvious to you, and to those who have long taken an interest in the question. If you will suggest such, the Committee are prepared to consider them with respectful attention. They now appeal specially to those who in other days have laboured in the cause; to those who pressed their views on an indifferent people and an apathetic legislature; to those who persevered, though hope was faint and success far distant, to show, in their communications to the Society, that their convictions still continue unchanged, and that the necessity for measures of this kind, so far from having passed away, is becoming hourly more urgent. The views thus submitted to them the Committee propose to embody fully in their Report.

"It is generally understood that great efforts will very soon be made to introduce, on a national scale, improvements in the existing modes of industrial instruction. It will conduce to the true welfare of the country, that changes authoritatively suggested should be in accordance with the convictions, nay even with the prejudices, of the people. Self-supporting, institutions of this kind must be, or they will dwindle away: self-governed too, or they will become open to suspicion, or exposed to peculation.

"The Committee believe, if the friends of social improvement will now come forward, and merge their minor differences and matters of detail in the recognition and adoption of the great cardinal principles which should rule the development of this great phase in our social progress, that success may be achieved. These principles are, self-support, self-government, and unity of action. The abnegation of special plans and cherished theories is essential to success, because no man nor body of men can hope to establish their own views without modification or change. It is a distinguishing feature of all successful social reforms, that they are the growth of mutual compromises—the results of reciprocal concessions. Thus the interests of all classes are recognized and preserved. Indeed, it is hard to understand how it can be otherwise in a free country.

"I shall feel obliged if you will favour me with your reply, at your *earliest convenience.*

"I am, Sir,

"Your very obedient servant,

"Edward Solly, *Secretary.*"

It appeared to us also to be a matter of great importance to ascertain, if possible, the opinions and feelings of that large and influential class of persons who must necessarily superintend or actually work out any practical plan of industrial instruction which may be proposed to the country for its acceptance. We therefore addressed circulars, similar in purport to the preceding, but somewhat varied in form, to the directors of most of the larger mechanics' institutions, to the head masters of the endowed grammar schools, and to the principals of several proprietary and private schools. To those circulars we have received several hundred communications in reply, conveying to us the expression of the most cordial sympathy with our object, of hope for the success of so important a movement, and of regret that reform has been delayed so long. From a few we have received communications expressing either partial disagreement with the objects proposed, or hinting doubts of the ultimate success of any movement of this kind. These, as conveying the expression of opinions at variance with the conclusions to which the Committee have arrived, we believe it our duty to publish. As to the rest, we regret that the many and pressing claims on the funds of the Society of Arts will not permit us to recommend to the Council to print the whole. We are compelled to make a selection. We regret this, because, though the weight of an individual opinion may in itself be small, yet the cumulative force of the concurring convictions of men of different classes and creeds is seldom undervalued, nor is it to be easily withstood. Universal consent has been taken as one of the tests of truth.

Mr. Edmund Potter, Mr. Rhodes, Mr. Clay.

The tone of their letters to the Committee will show the unanimity of their feeling.

Answers in reply to this Circular.

Sir David Brewster—

"Begs leave to express his warmest approbation of their plan for extending industrial instruction over the Kingdom."

The Rev. John Clay, Chaplain of the House of Correction, Preston, writes,—

"I offer you my humble but hearty adhesion to the sound views which your paper enunciates."

Mr. William Sands Cox, F.R.S., of Queen's College, Birmingham, says, in his letter to the Committee,—

"I shall be most happy, in every way in my power, to co-operate with 'the Committee of Industrial Instruction' in their endeavour to carry out the great principle so ably and clearly set forth in their address."

Mr. William Ellis, of Champion Hill, Camberwell, well known as an active labourer in the cause of education, thus expresses his approval of the object of the Committee,—

"I sympathize greatly in all your expressions and proposals; and there is nothing which I am attempting which would not be promoted most powerfully by the adoption of what you seem to be aiming at."

Mr. W. R. Grove, F.R.S., thus writes,—

"It appears to me most desirable, that in any great movement for educational reform there should be one plan uniting the wishes of the great majority of those interested in the subject, and also embracing in it, as far as can be, existing institutions. In this country, from the very freedom of action enjoyed, great and comprehensive works are generally impeded by the separate and frequently opposing actions of those interested in similar objects, and holding similar views."

Mr. E. Headlam, M.P., is—

"Ready to join in any general movement, to promote a comprehensive system of national education with industrial training, in such manner as may tend to advance our social improvement, to benefit the arts, manufactures, and commerce of the country, and to remedy the great and increasing evils of juvenile delinquency."

Dr. R. G. Latham, F.R.S., says,—

"I am not afraid of the classical scholarship of Great Britain being impaired by any advance (however great) of science. It may change its character, and this it is doing; but I do not expect that that character will deteriorate. The imperfection of the existing methods of teaching makes it quite probable that, with an increase of educational knowledge, the present average amount of scholarship may be attained by a less expenditure of time than is the case at present. Something has been done in this way already, and more is doing. Hence the notion, that we cannot teach one subject except at the expense of another is, to a certain degree, exceptionable."

Professor W. H. Miller, F.R.S., of Cambridge, writes,—

"In the creation of new institutions, or in effecting organic changes in old ones, it will be easy to introduce improvements which, if the opportunity be now neglected, cannot without extreme difficulty be afterwards done. I cannot too strongly urge the necessity of taking due precaution, in starting your schemes, for laying the foundation of the industrial or art education, by thoroughly teaching the elements of mathematics, especially geometry. I am aware that there will be great difficulty in doing this, on account of the strange jealousy of everything like science on the part of the so-called practical men in this country—men who in their own best works commit the most glaring blunders, for want of a smattering of geometry and physics; and who hold that scientific acquirements are a bar to the possibility of gaining a knowledge of strength of materials, prices of earthwork, masonry, &c.; and who act upon this conviction by a discreditable compact to keep out of the practical professions all men possessing the requisite scientific preparation."

The Rev. Professor Moseley, F.R.S., says,—

"I beg to express my hearty concurrence in the movement the Society of Arts proposes to make in favour of industrial education. The cause is indeed one which I have advocated for many years."

The Rev. Thomas Mozley says,—

"The Society of Arts, as is proper, only looks on some of the deficiencies in English education. There are others I think as much of, e.g., geography, history, poetry, music (where there exists any taste for it) chemistry, natural history, botany, &c. But I quite agree with you in the opinion that every child, rich or poor, should be taught the elements of drawing, mathematics, and mechanics. I think these things can be learned, up to a certain extent, much earlier than is commonly supposed, and, once learned, they become imperishable acquisitions, and the foundations of indefinite progress. But

without supposing that there can be in many cases either the leisure or the call for such progress, the mere elements are of very great value."

John Phillips, F.R.S., Assistant General Secretary to the British Association for the Advancement of Science, says,—

"A central power of direction will not be and cannot be obeyed without disadvantage; but a *centre of advice and instruction* will be respected. If at the same time it should be enabled to assist the deserving, and to confer honour on the successful student, it would act beneficially on the whole system of national industry. . . . *Mere principles can be taught* and illustrated in schools of arts, but the manual skill and trustworthy experience which earn wages can only be learned by something like the old process of master and apprentice. . . . So much of geometry as lies at the root of the harmony of proportion, governs the disposition, and determines the strength of materials, must be made a part of ordinary technical education."

Professor Pillans, in his letter to one of the Committee, writes,—

"I beg to express my cordial concurrence in the sentiments and views expressed in the circular. The first two of the suggestions of the Committee are obviously of prime importance."

The Rev. Henry Renton, M.A., Moderator of the Synod of the United Presbyterian Church of Scotland, writes to the Committee,—

"I very highly approve of its specific object—the introduction of *industrial instruction* into the seminaries of national education—is a branch of great importance not only in connexion with the 'promotion of Arts, Manufactures, and Commerce,' but, what is of higher moment, in connexion with the social happiness and moral welfare of the people.

"I am delighted also with the principles on which it is proposed by your Committee that the object should be sought of 'self-support, self-government, and unity of action."

The Venerable Archdeacon Thorp, Warden of the University of Durham, says, in his answer to the Committee,—

"I consider industrial instruction to be of paramount importance in the present condition of society; and that I believe it may be satisfactorily carried on in connexion with the universities; and in the north of England with the University of Durham."

Sir John Villiers Shelley, M.P., says,—

"The suggestions thrown out by the Committee, and upon which my opinion is asked, meet with my entire concurrence."

Mr. James Simpson, Advocate of Edinburgh, thus expresses his opinion,—

"As a zealous, though humble, educationist, of a quarter of a century's standing, I cannot but feel interested in the views of the Society on this subject. We were beaten—unmistakeably beaten—especially by the French *Exhibitors* in 1851, wherever manufactures particularly depended on science."

Summary of arguments of Correspondents.

It will probably be more satisfactory to the Council, and will tend to condense our Report, if we analyze and arrange the views and arguments of our correspondents, and state them in a connected form; expressing their views sometimes in their own words, rather than give a long series of unconnected extracts, which often repeat the same sentiment under different forms

of expression. We give references in the margin for the use of those who may desire to refer to the original communications.

Question formerly discussed with no practical result.

The Committee have found, that discussion on the subject of education and technical instruction has been conducted in this country for many years in an unsatisfactory manner. The promoters of an improved education appealed to theory, and established their case on abstract argument alone. They had but few facts to adduce. Their opponents, on the other hand, pointed to our unrivalled supremacy in trade and manufactures, as the surest test of the soundness of their own views. The Great Exhibition, however, as it has been stated by those conversant with the subject, dispelled this illusion. Its influence has been most salutary. It at once showed to manufacturers their true position. It brought the truth home, not only to the well-informed few, but to the mass of our ill-instructed population. This could have been done in no other way. No amount of oral testimony, or of written evidence, would have produced such an effect on the public mind. M. de Cocquiel, an intelligent foreigner, who was sent over here to inquire into, and to report to the Belgian Government, on the state of industrial instruction in this country, makes the following observations,—

Effect of Great Exhibition.

"The manufacturing classes are fully alive to the necessity which has become manifest of organising a complete system of industrial instruction. The Exhibition of 1851 has aroused the national feeling, and given the impetus to this movement, which is daily gathering strength. The Universal Exhibition was a great school in which every nation came to seek, from the example of others, the means of improving its own labour, its own industry; and the British people have themselves been extensively benefited by the improvements which their rivals have brought to the work of production. The idea which originated the Great Exhibition, is now fructifying and developing itself in the United Kingdom, and will certainly eventually expand to a magnificent system of industrial instruction, which I have no doubt, will, ere long, serve as a model to all the nations of the Continent. Assuredly this would be a great and noble task for the nation which for the last quarter of a century has given the signal of all the great reforms demanded by civilization.

"In Belgium, as well as in England, the constantly growing necessity of organizing industrial instruction has been recognized by an intelligent and enlightened government."*

That these opinions are well founded the memorials clearly show which were presented to the COMMISSIONERS FOR THE EXHIBITION OF 1851, from the magistrates, bankers, merchants, manufacturers, designers, and others of Birmingham, Bristol, Halifax, Hull, Oldham, Sheffield, and the Staffordshire potteries. The Memorialists of Birmingham say,—

"Your Memorialists have long felt the necessity of some more extended system of practical and scientific education in England, which should place

* Report of M. Cocquiel to the Belgian Government, on Industrial Education in England,—Page 5.

within the reach of the industrial classes a much higher standard of scientific attainments than they can now ever hope to possess without very ample means.

"Your Memorialists are convinced that with greater facilities in elementary scientific education, intimately connected with, and always accompanied by practical illustrations and manipulations, there would be found as much original genius and talent to develope in the people of this country, as in those of the great continental states of Europe; and that such development would greatly facilitate the maintenance and extension of our manufactures and commerce.

"The great and rapid strides which locomotion has taken on the Continent, and the constant international communication which is the result, have extended science and mechanical and artistical knowledge widely over those nations; and thus one vast school of arts and sciences exists, with its members in constant communication, from which this country is partly excluded by its geographical position. . . . .

"For such reasons your Memorialists would solicit that a great Central College of Arts and Manufactures should be established in London, and endowed with the whole of such surplus receipts, which will probably exceed 200,000*l.*, and that a Museum of Arts and Manufactures shall be formed at the College, the basis of which might be most advantageously selected from the present Exhibition.

"That provincial schools having the same object in view (such as schools of design) should have connexion with the Great Central College, and be carried on under the same system; and in order that the public may be satisfied with the administration of their provincial establishments, and have a voice in the general system of education, which is of such vital importance to their own commercial prosperity, your Memorialists would suggest that where such provincial schools may be founded in boroughs, the Mayors should be *ex-officio* members of the General Board of Metropolitan Direction."

And to the same effect the Memorialists of Bristol,—

"Your Memorialists are reluctant to do more than express their approbation of a plan which they consider presents prospective advantages of greater magnitude to the whole community than any other that has been brought under their notice, namely, the establishment of a Collegiate Institution in London, resembling in some degree the Central School of Arts and Manufactures at Paris.

"It would be superfluous in your Memorialists to point out the advantages resulting to our artizans from having within their power the means of obtaining, at a moderate expense, a sound scientific and practical education in those branches of trade or manufacture to which their lives are to be devoted. These advantages are too obvious and well known to your Memorialists think that no more legitimate mode of applying the surplus at your disposal can exist than by appropriating it to the elevation of the character and intellect of the British workman, to whose skill and ingenuity (however untutored) the Great Exhibition owes so much; by encouraging discovery, stimulating industry, and offering him the same facilities for acquiring knowledge in his profession which are enjoyed by his foreign competitors."

In the Memorial from Halifax it is stated,—

"Your Memorialists, immediately identified with one of the most important branches of the fancy textile productions of this country, have long felt, in common with other manufacturing districts, the great disadvantages under which they labour from the lack of a more accomplished education amongst the operative classes of the United Kingdom in the higher departments of art and science. Your Memorialists therefore humbly submit that a more

appropriate dedication of the surplus funds, nor one more directly in harmony with the originally expressed intention of your Honourable Board, could hardly be adopted than that of founding on a national basis a scheme of education calculated to remove the disadvantages already referred to, alike important to the prosperity and welfare of every class of the community. It is abundantly recognized to what extent institutions of this kind have been promoted by our continental neighbours, and were practical evidences of the important benefits resulting from such a course not otherwise supplied, the truly elegant productions of France, Italy, and Germany, which grace their several departments in the Crystal Palace, would amply establish them.

"Your Memorialists feel it unnecessary to enter upon the details of such a project, as they will be so much more ably dealt with by your Honourable Board. They would only add that, in their humble judgment, unless a grand Institution were founded, in which facilities were given of combining practice with theory, so that the student might pursue the one in direct association with the other, a scheme of such a character would best answer its purposes if made to embrace a series of local establishments, acting under and in concert with one central Institution, constituting in the whole a National College or University of Arts and Industry, empowered to grant certificates or diplomas to students of proficiency and merit."

The merchants and importers of Hull say,—

"Your Memorialists are in a position, from their connexion with the import and export trades, to state, that the increased facilities of transport have of late years produced a greater distribution of fuel and of raw materials over the world; and that the increased facilities thus afforded obviously necessitate an increased amount of knowledge, in its adaptation to manufactures, because the raw material, once from local circumstances confined to one country, now, at a reasonable rate, is made available to all countries.

"Your Memorialists are informed that the great continental states of France and Germany are so fully convinced of this circumstance that they have established central colleges and provincial schools of arts and manufactures, which are exercising much influence in the progress of industry. Your Memorialists perceive that unless a system of industrial education is extended to this country, so as to enable our manufacturers to apply increased science and skill to their manufacturers, England cannot keep her position in the great industrial competition of all nations; a competition which has for its effect the increase in value of skill and intelligence, as applied to the manufacture of that raw material, which, by the facilities of transport, is becoming decreased in price. Your Memorialists see, therefore, to themselves a great advantage in giving to manufacturers the means of acquiring a scientific knowledge of the principles of their industries, so that they may apply them with the best advantage to their respective wants.

"Your Memorialists would therefore impress upon your Honourable Board the necessity of establishing a Central College of Arts and Manufactures, in connexion with provincial schools, having the same object in view. They have full reliance that the great practical skill and aptitude of application which is a marking feature of the character of our countrymen, will enable our manufacturers to use the knowledge which they will thus have an opportunity of acquiring for the best purposes of industry."

The Memorialists of Oldham express—

"Their regret that there does not exist in this country any national institution devoted to instruction on a similar basis to the Schools of Arts and Manufactures established in France and Belgium, which, by imparting to their students the knowledge of the principles on which all improvements must be founded, have contributed so largely to the development of manufacturing skill.

"Your Memorialists would, therefore, solicit your Honourable Board to take into consideration, in the disposal of the surplus fund which may remain in your hands, the immediate advantage which would be likely to accrue to the manufacturers of this country by the establishment of a Central College of Arts and Manufactures in connexion with provincial schools for the same object, which should include the existing Schools of Design. This institution to be empowered to make examinations and grant certificates to the more advanced students, and to promote, by these and similar means, the cultivation of increased knowledge in the application of science to practical pursuits, which could not fail to exercise a beneficial influence on industrial progress."

The Memorialists of Sheffield express their approbation of what has already been done for the promotion of science and art:—

"Your Memorialists have observed that Government has considered it desirable to establish a Government School of Mines, in connexion with the Museum of Practical Geology, and they perceive in this act a recognition on the part of the State of the want of practical education to a large branch of industry. But your Memorialists in vain look for a college devoted to the industrial pursuits which they themselves follow, or to those important textile manufactures carried on by the neighbouring manufacturing towns.

"Your Memorialists acknowledge that in collecting specimens from different exhibitors for the purpose, as they suppose, of founding a Museum of Arts and Manufactures, you are proceeding in the direction of education; but they are fully convinced that such collections can only be made efficiently useful when used as a basis of instruction, and that as a mere collection they cease to be of much importance in the advancement of industry.

"Your Memorialists therefore present these points for your consideration, in order that you may judge whether arts and manufactures might not be much promoted by the establishment of a central college of arts and manufactures in connexion with provincial schools for the same object. They consider that the schools of design might be made the nuclei for this more extended system of education, and that designers themselves would be benefited by being taught the principles of the manufacture for which they are afterwards to design, because by this means they would better understand its wants and the possibilities of manufacturing processes to carry designs into execution.

"They consider that if these branch institutions and the Central College were united into one university of arts and manufactures, empowered to make examinations and grant certificates to those who showed sufficient knowledge, an impulse and position would be given to manufacturing science which could not fail to be of benefit to the progress of industry."

The Memorialists of the Staffordshire Potteries enter at considerable length into the question. An extract from their memorial will suffice:—

"Your Memorialists are confidently of opinion, that a more extended and practical system of scientific education is necessary in this country, a system which should offer on readily available terms to the industrial classes of England a much higher standard of productive acquirements than they now possess, and that ample facilities for a sound elementary education, in intimate connexion with, and accompanied by, practical illustrations, alone are wanting to develope in our artists and artizans as large an amount of genius and talent as is evidenced in the best productions of the great continental emporiums, and also that such a development would greatly tend to the increase of our manufactures and commerce.

"Your Memorialists anxiously desire that by some suitable system of practical and scientific study, the inherent talent and industry of the productive classes of this country may be advantageously developed. They gratefully acknowledge the policy of the step made in this direction by the Government, in the foundation of the Schools of Design, and the Museum of Practical Geology; but the first are only partial in their advantages, and the latter but an isolated branch which exerts but little immediate influence on arts and manufactures generally.

"Your Memorialists feel fully the value of the arguments set forth in the appeal on this subject from Birmingham to your Honourable Board, and would most earnestly and respectfully urge that due advantage be taken of the present opportunity, one altogether unprecedented, and probably without the chance of recurrence, to turn it to some great and lasting national benefit. They would therefore recommend that a Central College of art and manufacture be established in London, and a museum connected with it. That provincial schools should be established, and conducted on similar principles to the Metropolitan Institution, and receive a proportion of its advantages, and that where such provincial schools or colleges may be established, the provincial authorities shall have prominent consideration in their control and management."

To the Great Exhibition, above all other causes, may therefore be traced the striking change which has occurred in public opinion, on the subject of industrial instruction, within the last two years. Of the vast number of communications, which we have received in reply to the circular letters we issued, all concur in the belief that improvements in our systems of education are necessary. It is not to be expected, that entire concurrence of opinion should prevail, as to what this change ought to be.

We must not, however, lose sight of the fact, as it has been judiciously observed by one of our correspondents, that foreign nations, having thus had an experimental proof of the advantages they owe to industrial instruction, and how much science has compensated to them the deficiency of raw material and of capital, will now, even more strenuously than ever, cultivate this growing element of production. The Great Exhibition will thus have been to them a great encouragement. Hence, were we to remain as we are, the relative positions of this country and of foreign nations with respect to manufactures would no longer continue the same. As M. de Cocquiel well observes,—

"The statesmen of England have thoroughly well understood the question in this respect; the Exhibition of 1851 was to them a gleam of light which they will not fail to turn to profitable account. But this is an additional reason why other nations should gird on their arms and prepare themselves for the conflict, that they may not lose the ground they have so laboriously gained.*"

Some are unwilling to promote industrial instruction.

There is still, we are told, in some quarters, an unwillingness to promote industrial instruction, especially so far as the cultivation of taste in the Fine Arts is concerned. At the present time

* Report to the Belgian Government on Industrial Instruction in England, p. 73.

manufacturers of large capital find it more profitable to import that precise quantity and quality of artistic skill they require, ready made, than to raise it at home. But, however advantageous such policy may be to the manufacturers at present, such motives ought to have no weight with those who undertake to secure the present prosperity, and to provide for the future welfare of the nation. M. de Cocquiel says,— Mr. J. Mercer.

"The manner in which English manufacturers proceed in this respect is most deplorable, no less as concerns themselves and the public, than as regards its bearings upon the development of the art of ornamental design. The French manufacturer employs designers whom he pays liberally, but who exclusively devote themselves to their special branch of business; the manufacturer does not interfere, and the designer takes upon himself the entire responsibility of the design which he executes. In England these matters are managed very differently. There the majority of the manufacturers employ agents who are on the watch to obtain, by any means, patterns of the new articles that appear in the great continental markets, and sometimes, when the goods come out, they find themselves forestalled or followed by rivals who have pirated the same pattern. Sometimes the foreign patterns are modified by varying the arrangement and quality of the colours. This delicate operation is directed by the manufacturers, sometimes it is left to the workmen themselves, and the result is often seen in those patterns jarring in colour and absurd in form, overladen with a multitude of incoherent accessories, from which we avert our gaze as we would stop our ears in the neighbourhood of discordant music. Under such conditions it becomes impossible that articles of fashion and taste should bear a distinctive stamp."

Urged that there is no necessity for it.

It has been said, in reply to all that can be advanced to show the necessity of promoting industrial instruction, that the supply of science is always equal to the demand for it, that none of our works, either public or private, are at a stand-still, because architects, engineers, or skilled workmen are not to be had; that we have attained to an eminence of commercial and manufacturing prosperity, unrivalled in any age of the world, and that all this has been accomplished without the aid of colleges of chemistry or of schools of industrial instruction; that whenever great discoveries were wanted, men to make them have always been forthcoming; and that improvements or discoveries in the arts and sciences are rather the accidents of a lucky chance, than the elaborated results of well-directed research and scientific investigation. But, in reply to this, it has been well observed, that the question which really concerns us is, not how this superiority has been acquired, but how it is to be retained. It must not be forgotten that England has had the start of the nations of Europe; while we have been engaged in the peaceful pursuits of industry, they have been torn by internal convulsions. M. de Cocquiel to this effect observes, in his Report to the Belgian Government,—

"England has likewise had the good fortune to devote herself to manufacturing pursuits before the nations of the Continent had entered upon that path; and, when in her turn, she applied herself to the study of the arts and sciences

which were already being cultivated on this side of the channel, she had the still further good fortune not to be distracted from them by the revolutions, the political and social commotions, and the wars, which have devastated the Continent. . . .

"This, I am firmly convinced, is one of the first causes, the fundamental one, of her manufacturing superiority. It is because she has better understood commerce than other nations, that she has seen her labour prosper and develope itself in her manufactures; and that the latter, by a constant increase of production, have attained a degree of improvement unknown elsewhere. It is because England has been endowed, in the highest degree, with the genius for this special branch of commercial barter, that she had been enabled to realize in her relations with other nations, fairly enough it must be admitted, enormous profits, which she could devote in the shape of capital to the improvement and advancement of her home manufacture.

"It is, therefore, in some respects, owing to circumstances foreign to manufacturing skill, that English manufactures have obtained the immense superiority which they now enjoy. It would, therefore, in my opinion, be very illogical to draw any conclusion whatsoever against the advantages to be derived from industrial instruction, from the fact that England, the greatest manufacturing power in the world, is nevertheless deprived of its advantages.*"

In the House of Commons, the late Chancellor of the Exchequer, Mr. D'Israeli, is reported to have said,—

"There is no doubt that the time has come when we must study more the industrial education of the people of this country, and when we must bring the influences of science and art to bear upon productions more than they have prevailed up to the present period. A great revolution has for some time been taking place in those circumstances which have given superiority to our manufactures. Hitherto this country has exercised a very great supremacy by its command over the raw material; but daily the raw material is becoming more equalized in price from the improved system of locomotion, and it will be impossible to sustain the supremacy of our manufactures by merely a superior command over the raw material. The time has come when the intellectual element becomes one of the most important elements of competition. This was felt very much during the period of the Great Exhibition, and I believe I may say that it was the result at which the scientific men arrived, after exercising upon that occasion the office of jurors, and examining with impartiality the productions of all countries in competition with our own,—they arrived at the result, which it was unnecessary then ostentatiously to announce, that if we wished to maintain our superiority in the arts of production, we must consider that the intellectual element in production must be more studied and cultivated than heretofore. They found that in some countries there was a superiority in designs; that from scientific agencies there was a power of competition with us, who had only the superior command of the raw material to support our industry; and that, in fact, the time had arrived when we must seriously consider of increasing the means by which we were to maintain our superiority in that respect. Now, Sir, in all the countries of Europe this great want has long been recognized. There is not a town of any eminence in which there is not a school where the influences of science and art are brought to bear upon human productions, and there is not a capital in Europe in which there is not an industrial university.

"The result of our evidence at the Great Exhibition, of our observations of what has taken place in other countries, and of the convictions which arose,

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* Report of M. de Cocquiel to the Belgian Government, on Industrial Instruction n England.—Page 3.

not only in the minds of men of an esoteric turn, but with practical views, was, that the time had come when it was necessary that a great effort should be made by which an industrial education should be given in this country, and the influences of science and art upon productions be more systematically brought to bear. The subject at that time attracted the attention of the Royal Commissioners of the Great Exhibition, of whom it is unnecessary for me to observe that the head is the illustrious Prince, of whom I may say that the country is on that account deeply indebted to him, because, probably, he is more qualified than any man in this country to elevate, to refine, and to form the tastes of the people; and sure I am, that while he is more qualified than any other person, there is no one who has addressed more indefatigable hours or more unceasing thoughts to this purpose."

To the same effect Lord Seymour observed,—

"That the people of this country had been imagining that they were superior to those of all other countries in manufacturing art, but as they had lately had the advantage of collecting the productions of art and the manufactures of other nations, they had seen that, unless they took care, they would soon be left behind in the race. He fully admitted, therefore, that it was most important that something should be done for promoting the industrial education of the people, and he thought so far they ought to be grateful to the Commissioners for the general plan they had sketched out."

On the same occasion Lord John Russell said,—

"The Commissioners had been anxious, when they found the large sums in their hands, that some institution should be established which might commemorate the Great Exhibition of 1851. It was thought it would be unwise to allow the benefits of that Exhibition to be merely transitory, and that some attempt should be made to perpetuate the advantages which were derived from it. Nothing appeared more likely to effect that object than an institution for extending the advantages of science and art to the industry of the country. He thought no one could have inspected the Exhibition without being convinced of the truth of an observation in one of the reports of the Commissioners, that in future there would be great and severe competition in the industry of the world, which would assume a more intellectual character. . . . He could not but believe that this was the commencement of a great improvement. He was very glad to find that the Government had taken up the question, and he believed that, under the guidance of the illustrious Prince who was at the head of the Commission, they would be able to render very great services to the country, and materially to promote the progress of science and art.'

We are told, by the most unquestionable authority, that the interval by which we are in advance is rapidly lessening every year. The causes of this advancement have been ably shown by Dr. Lyon Playfair, in his Lecture on Industrial Instruction,—

"Production involves as its factors, primarily, the material to be converted into an utility; then, the labour employed in the conversion; and, lastly, capital, which has been compared to the blood corpuscules, because it imparts vigour and activity to the vital processes, without itself taking direct participation or undergoing assimilation. The first factor—the raw material—is common in excellence to all producers, differing only in the relative cost of extraction and transport, or increased in price by arbitrary fiscal regulations. As locomotion improves, the local advantages of the country to which the raw material is indigenous, become of less importance as an element in production; and industrial competition depends more upon labour—the second factor—than upon the first. This is certainly the case, or raw cotton could not be imported from America to be exported as calico. Malachite, sand,

and wool could not come from Australia to go back as copper, glass, and broad cloth; nor could Dutch madder reach us to return to Holland as printed ginghams, or horse-hair and fat from Buenos Ayres and Russia to be returned as hair-cloth and soap. All this shows that the superiority of labour in one country does more than compensate for the disadvantages arising from increased cost in the raw material."

This argument has also been forcibly yet briefly put by that great statesman, the late Sir Robert Peel,—

"All the facilities of intercourse are operating as bounties to skill and intelligence. They are shortening the distance between the producer and consumer, and it is not safe for us to remain behind-hand; for, depend upon it, if we are inferior in point of skill and intelligence, or general knowledge, to the manufacturers and producers of other countries, the increased facilities of intercourse will result in transferring the demand from us to others."

Capital.

To this we must add, that but little aid is to be expected from the application of augmented capital to manufactures. Every kind of productive industry in this country is saturated with capital. There is a superfluity of that element of production. To this it is replied, that this superfluity of capital is of great advantage in stimulating new sources of productive industry; but this only the more clearly shows that existing industries do not advantageously admit of the productive application of increased capital.

Of the three elements of production, raw material, capital, and labour, the latter is therefore the only one in which it remains open for us to advance far in the line of improvement. Now, as Dr. Playfair has shown, labour is of two kinds,—

"Corporeal and mental, or, as Mill calls it—muscular and nervous. Mere muscular labour is to be had in all countries: the Egyptians, with their hoes and baskets, are found to be as good excavators as those we sent over with barrows and spades; but Egypt had to import the mental labour of a Stephenson before it ventured to produce a railway. The fact is every day more apparent, that mere muscular labour, in the present state of the world, is little better than raw material, and that both these are sinking in value as elements of production, while nervous or intellectual labour is constantly rising. The whole of industrial competition is now resolved into a struggle to obtain a *maximum* effect by a *minimum* expenditure of power. But this power is derived from natural forces, and not from brute strength: mental labour has engrafted itself upon muscular effort, and, by a healthy growth, has reduced the size and relative importance of the latter. Every new acquirement in the knowledge of natural forces is the acquisition of a new sense, which may be applied to production; and as every substitution of a natural force for muscular exertion depends upon a knowledge of the former, it surely requires no argument to prove, that the economical application of it must rest upon a perceptive and not merely empirical knowledge; or, in the language of the Wise King of Scripture, 'If the iron be blunt, and we whet not the edge, then must we put to more strength; but wisdom is profitable to direct.'

"Now the forced perception of the necessity for industrial instruction has enabled the continent to seize the *growing* element of production, while we are left in possession of the *decreasing* one; and while we continue to rely upon local advantages and acquired experience, we allow a vast power to arise abroad which is already telling against us with wonderful effect. It is most essential that we should furnish this element of strength to our producers."

We should do injustice to the views thus placed before us, if we omitted to give a few of the clear, able, and logical arguments of the Report made to the Corporation of Brown University, Providence, United States, on the subject of extending the means for promoting industrial instruction in the colleges of the United States,—

"If reasons need be offered for attempting the changes in our collegiate system that have been here indicated, the following will readily suggest themselves:—

"1. It is Just.—Every man who is willing to pay for them, has a right to all the means which other men enjoy, for cultivating his mind by discipline, and enriching it with science. It is therefore unjust, either practically or theoretically, to restrict the means of this cultivation and discipline to one class, and that the smallest class in the community.

"If every man who is willing to pay for them, has an *equal* right to the benefits of education, every man has a *special* right to that *kind* of education which will be of the greatest value to him in the prosecution of useful industry. It is therefore eminently unjust, practically to exclude the largest classes of the community from an opportunity of acquiring that knowledge, the possession of which is of inestimable importance, both to national progress and individual success. And yet we have in this country, one hundred and twenty colleges, forty-two theological seminaries, and forty-seven law schools, and we have not a single institution designed to furnish the agriculturist, the manufacturer, the mechanic, or the merchant, with the education that will prepare him for the profession to which his life is to be devoted.

"Our institutions of learning have generally been endowed by the wealth of the productive classes of society. It is surely unjust that a system should be universally adopted, which, practically, excludes them from the benefits which they have conferred upon others.

"2. It is Expedient.—The moral conditions being equal, the progress of a nation in wealth, happiness, and refinement, is measured by the universality of its knowledge of the laws of nature, and its skill in adapting these laws to the purposes of man. Civilization is advancing, and it can only advance in the line of the useful arts. It is, therefore, of the greatest national importance to spread broadcast over the community that knowledge by which alone the useful arts can be multiplied and perfected. Every producer, who labours in his art scientifically, is the best of all experimenters; and he is, of all men, the most likely, by discovery, to add to our knowledge of the laws of nature. He is, also, specially the individual most likely to invent the means by which those laws shall be subjected to the service of man. Of the truth of these remarks, every one must be convinced, who will observe the success to which any artizan arrives, who, fortunately, by his own efforts (for at present he could do it in no other way), has attained to a knowledge of the principles which govern the process in which he is employed.

"Suppose that, since the Revolution, as much capital and talent had been employed in diffusing among all classes of society, the knowledge of which every class stands in need, as has been employed in inculcating the knowledge needed in preparation for the professions, is it possible to estimate the benefits which would have been conferred upon our country? The untold millions that have been wasted by ignorance, would have been now actively employed in production. A knowledge universally diffused of the laws of vegetation, might have doubled our annual agricultural products. Probably no country on earth can boast of as intelligent a class of mechanics and manufacturers, as our own. Had a knowledge of principles been generally diffused among them, we should already have outstripped Europe in all those arts which increase the comforts, or multiply the refinements of human life. Perhaps, in

the earlier history of our country, such knowledge would not have been adequately appreciated. That period, however, has now passed away. An impulse has been given to common school education, which cannot but render every man definitely sensible of his wants, and consequently eager to supply them. The time then would seem to have arrived, when our institutions of learning are called upon to place themselves in harmony with the advanced and rapidly advancing condition of society.

"IT IS NECESSARY.—To us, it seems that but little option is left to the colleges in this matter. Any one who will observe the progress which, within the last thirty years, has been made by the productive classes of society, in power, wealth, and influence, must be convinced that a system of education, practically restricted to a class vastly smaller, and rapidly decreasing in influence, cannot possibly continue. Within a few years, the manufacturing interest has wrung the corn laws from the aristocracy of Great Britain. Let any one recall the relative position of the professions, and of the mercantile and manufacturing interests, in any of our cities, twenty years since, and compare it with their relative position now, and he cannot but be convinced that a great and a progressive change has taken place. Men who do not design to educate their sons for the professions, are capable of determining upon the kind of instruction which they need. If the colleges will not furnish it, they are able to provide it themselves; and they will provide it. In New York and Massachusetts, incipient measures have been taken for establishing agricultural colleges. The bill before the legislature of New York, provides for instruction in all the branches taught in our colleges, with the exception of languages. It is to be, in fact, an institution for giving all the education which we now give, agricultural science being substituted for Latin and Greek. What is proposed to be done for the farmers, must soon be done either for or by the manufacturers and merchants. In this manner, each productive department will have its own school, in which its own particular branch of knowledge will be taught, besides the other ordinary studies of a liberal education. A large portion of the instruction communicated will thus be the same in all. Mathematics, mechanics, chemistry, physiology, rhetoric, moral and intellectual philosophy, and political economy, will be taught in them all. The colleges teach precisely the same sciences, with the addition of Latin and Greek, in the place of the knowledge designed in these separate schools, for a particular profession."

The faculties of man should be cultivated in harmony with the development of natural forces.

There is, however, another aspect of the cultivation of science which deserves consideration: the necessity of developing those powers of man which are most in harmony with natural forces, as they are being further revealed to us. The early discoveries in science were mechanical; they enabled us to intensify or to enfeeble given forces to any extent. The mechanical powers are an example, applied in the transmission of forces already in operation, such as the muscular power of man, or of other animals, the force of gravity, the elasticity of gases, &c. Here no latent forces are developed. Active forces are husbanded for an intensified effect, or are spread over a lengthened period of time, weakened in energy, but continuous in operation. Of this latter case, the mainspring of a watch is a familiar example. The discovery of the properties of steam was the introduction of a new prime motive power. Still, however, it could be taken advantage of only through the instrumentality of machinery.

But in our day, the *imponderable* properties of matter, as they are sometimes called, are in a state of rapid development. They will most probably play an important part in the progress of human society. The sun has become a limner, the electric fluid a postman, galvanism thrusts aside the goldsmith, and chemical action dispenses with the need of mechanical agency. These views, suggested by experience and by the course of discovery in natural science, go no further than to fathom the depths of that profound aphorism of Bacon, "Man hath power in natural things only to bring them together and to set them asunder; nature conducteth her processes in secret."*

Now the tendency of all these discoveries is in the one direction, to render muscular power or brute animal strength, from day to day, an agency of lessening importance, while, in the same degree, or rather in a much higher ratio, it calls for the exercise of refined intellectual power. For example, in cotton-mills and factories, the feebler strength of women and children has supplanted the robuster vigour of able-bodied men, and the locomotive has driven the horse from the great lines of communication. On the other hand, an increasing amount of intellectual skill is required to guide the steam-engine, to prepare the photograph, to work the electric wire, or to manage the electrotypes. On the farm, the steam-engine supplies the place of manual labour, and agriculture is fast becoming a branch of chemistry. To meet this altered state of things, it is obvious the kind of instruction hitherto given must be modified and enlarged. The knowledge which half a century ago would have constituted its possessor a man of science, does not now suffice for the everyday working uses of the intelligent artizan. This shows that the question is not one of mere competition. Were we the only producers in the world, it would still be our interest to provide for this development of natural forces by an adequate cultivation of those powers of man which correspond to it. "Nature is subjugated only by obedience,"† is the maxim of Bacon. There is also another great advantage that would result from an improved instruction of this kind. Men would no longer have to pass their lives in hopeless wretchedness whenever that branch of art or manufacture, to which they happened to turn their early attention, chanced to fail, either through the change of fashion, or the adoption of improved methods of manufacture. Education would give them that versatility of mind which would enable them to turn to something else. There are none so helpless as the hand-loom weaver or the farmer's boy. Their

* "Ad opera nil aliud potest homo quam ut corpora naturalia admoveat et amoveat; reliqua natura intus transigit."—*Novum Organon*, Lib. I. Aph. 4.

† "Natura enim non nisi parendo vincitur."—*Ibid.* Aph. 3.

skill is not rational but instinctive, like that of the beaver or the bee.

Professor Newman, in his Political Economy, observes,—

"Our poor urgently need industrial education. They ought not to commence routine work so early. The eye, the hand, the discrimination of form and of beauty, should have both broader and deeper culture. They should learn more of principles, less of details (that is, in their primary instruction); they should be taught to use tools and implements of the most various kinds, and in the most various ways, with strength or with delicacy. If a wide basis were thus laid, before they commenced their proper profession, they would afterwards be more versatile, and far less bigoted to a single occupation; and as soon as the lower wants of any trade were satisfied, they would develope some higher form of it. No sums which the State could lavish on such education would be extravagant; and in any case, laws forbidding the premature or excessive work of young people are eminently important."

This effect of an advancing civilization has been very forcibly expressed in the following observations,—

"Another important reflection is suggested by the influence of science on the occupations of working men. The attainments which a century ago would have sufficed to earn a comfortable livelihood, are now insufficient to rescue from destitution. It has recently been stated that, in London, one tenth of the labouring population is in this condition. We know that the great majority of these unfortunate beings are so, because they are ignorant and untrained, and consequently without the knowledge, skill, and power of steady application, which are necessary to subsistence in a country which is densely peopled, and considerably advanced in civilization. They possess, however, attainments which would be sufficient to provide themselves with the physical necessaries of life in a country where the population was thinner, and some of the land unappropriated. Their position resembles that of the American Indians when invaded by the Anglo-Saxon race. While the Indians were alone, in small numbers, and no superior people near them, their knowledge and skill were sufficiently great, and their habits sufficiently regulated, to enable them to live upon the game of their forests, and their wild prairies; but, surrounded by a higher civilization, they were incapable of maintaining their own position, and also of appropriating to themselves the skill and intelligence of their invaders. Their attainments were rendered valueless, and they either fled into remoter wilds or perished.

"This tendency of the progress of civilization to extinguish the ignorant and untrained, imposes upon the instructed members of the community the duty of aiding their less fortunate brethren in acquiring those additional attainments which its own progress has rendered indispensable for their subsistence: and hence an ever increasing necessity for an improved education of the mind unfolds itself as civilization advances; a provision for it ceases to be a charity, and becomes a claim and a duty that cannot be safely resisted.

"Those who, with a deficient education, are thus struggling against the difficulties which a higher civilization imposes upon them, perceive this, and feel it far more deeply than the middle and upper classes commonly suppose. Unfortunately, the sufferers look upon their own position only from one side; they see it obscurely, and through the medium of their passions, as men in their position naturally do. Like most men, they have but an imperfect perception of their own shortcomings; and thus they regard their misery as the result of a general conspiracy of the more successful classes against them. Hence they resort to machine-breaking, rick-burning, and land-steward shooting, as practical remedies, and respond to such doctrines as, 'Property is theft,' 'Competition is an iniquity,' &c. There are few, if any, errors that

have ever taken hold of masses of people, which, if candidly examined, will not be found to rest upon some truth, or fragment of truth; and thus it is with these wild atrocities, and the irrational consequences expected from them. They have a cause, in the misconduct of the superior classes against whom they are directed, which consists in their neglect to provide for the natural and necessary effect of advancing civilization upon those who, in many instances, have been rendered incapable of keeping pace with the general progress, by want of proper opportunity of obtaining the requisite qualification.*"

This is in truth nothing more than the argument of Bishop Butler, illustrated by the lights of modern discovery.

"If," says he, "the art of printing be a blessing, we ought to let the poor man share it with us. And if we do not, it is certain, how little soever it is attended to, that they will be upon a greater disadvantage upon many accounts, especially in populous places, than they were in the dark ages, for they will be more comparatively ignorant than they were then; and the ordinary affairs of the world are now put in a way which requires that they should have some knowledge of letters, which was not the case then; and therefore to bring up the poor in their former ignorance, now this knowledge is so much more common and wanted, would be, not to keep them in the same, but to put them in a lower condition of life than they were formerly."

No antagonism between theory and practice.

There is no opinion more deeply ingrained into the mind of this country, than the common belief, that there is an essential difference between science and practice. Some would be found to assert that the two are incompatible. This is not so: the mechanic, when he is engaged in contriving some complex piece of mechanism, calls himself a practical man; he despises theory, and cares nothing for mathematics. He is not aware that, at the very time, he may be illustrating a series of geometrical constructions of great complexity, perhaps of elegance. Men of the highest order of intellect, and whose researches are the most original and profound, have been "practical men." No one could have been more practical than Plato or Archimedes, than Newton or Wren, and a host of others. Practice and theory are but different phases of the same ground form of thought. They are inseparable, in the nature of things. The practical man, if he ever permits his thoughts to rise out of the servile mechanical construction of the work before him—if he asks, might not this be an improvement? could not that have been done in a better way?—becomes a theorist, while the theorist, when he seeks to realize his ideal conceptions, becomes a practical man. Theory and practice are therefore inseparable, however men may seek to disunite them by affecting to ignore the one or the other. It has been stated to us with much acuteness, that no one is a more confirmed theorist than the "mere practical man." Every process is with him a theory, he admits no change, for he will not experiment,—that would be to acknowledge science.

* Report on Mr. Williams's School, Edinburgh, p. 18.

Every science is built up of principles, and of the application of those principles; which latter, when carried forth into action, is usually termed an art. Thus we have the science of reasoning, the art of logic; the science of astronomy, the art of navigation; the science of geometry, the art of mensuration; the science of mechanics, the art of engineering; the science of hydraulics and the art of shipbuilding; and so on, through the whole circle of the sciences, almost every one of which is the basis of some cognate art. Now the most obvious, direct, and natural way of arriving at a real knowledge of any art, one should suppose, would be to master those principles on which the art is based; so that art, being nothing more than the application of principles previously learned, would only require, towards a perfect mastery of it, a familiarity with the practical details and manipulation incidental to such art. We should also reasonably infer, that a thorough knowledge of such fundamental principles was not only the best and shortest method of learning what is already known, not only the surest guide to new discoveries; but also the best director in those novel combinations of circumstances which must from time to time arise, and where the unreasoning practice of routine-processes can little avail towards furnishing a solution.

We have the high authority of the Cambridge University Commission giving its formal sanction to these views,—

"It may be quite true, that many of the practical and technical details of civil engineering may be best learned in the offices of engineers engaged in the execution of important works; but the knowledge of mathematics and of mechanical principles, as involved in the estimate of the strength and distribution of materials, the effects of elasticity, and generally of the operations of forces and pressures, is so necessary in all the more important and difficult applications of this science, that no amount of practical skill and experience can ever replace the want of this theoretical knowledge."*

Society of Arts has always protested against this error.

Against this inveterate prejudice the Society of Arts has been, for a century past, a standing protest. It has done its best to root it out; at one time by encouraging a scientific agriculture, again by offering rewards for an improved education, by strenuous exertions to revive the cultivation of the fine arts, by rewarding mechanical inventions and other scientific discoveries, and by the general promotion of science and its developments in the line of practical application.

To the Society of Arts is fairly due the idea and partly the working out of the Great Exhibition, a scheme not more successful in its result than gigantic in its conception. Within the past year it has brought into union and organized the co-operation of the principal mechanics' institutions of Great Britain—a project often attempted on a small scale, but which hitherto has

* Cambridge University Report, p. 97.

always failed. To their combination and unity of action these institutions must look for success. Indeed, they are now becoming conscious of a facility to express their wants, and of a power to act with effect. Had no other beneficial consequence followed from their union with the Society of Arts, these results alone would have been an ample return.

We shall now proceed to give a succinct review of the several opinions which have been communicated to us on each of the Eight Suggestions contained in our second circular. The Council will recollect that we published them with a view to concentrate public opinion on several distinct points, which many experienced persons consider of the highest importance.

The first suggestion on our list is,—

Grammar Schools.

"I. The improvement of the endowed grammar schools, more especially of those which are not intimately connected with the universities; to enlarge them so as to introduce among the subjects taught the elements of industrial instruction."

Aynho G. S.
Bowes G. S.
Brentwood G. S.
Bridgwater G. S.
Crewkerne G. S.
Grantham G. S.
Lancaster G. S.
Penryth G. S.
Shrewsbury G. S.
Tewkesbury G. S.
T. H. Bastard.
G. J. Bompus.
W. Felkin.
Rev. H. F. Gray.

The replies have been numerous from the masters of several of the endowed schools, and from various other persons who take an interest in the promotion of grammar school education. We would, in an especial manner, call the attention of the Council to the letters, printed in Appendix A., of the Rev. Dr. Kennedy, Head Master of Shrewsbury School, and of the Rev. Foster Barham Zincke, Vicar of Whersted near Ipswich. Most of these letters contain valuable hints; and they all, without a single exception, evince, on the part of the writers, an earnest desire to improve, if they only knew how; to reform, if practicable reforms were submitted. Some suggest that new rules be framed for the existing trustees, some that the appointments to the head masterships should be taken out of the hands of trustees and vested in a central board; others, again, are convinced that the Government should issue a Commission of Inquiry to examine into, and to report as to the present state of the grammar schools in England and Wales, originally intended to benefit the poor.* Many are indignant with the Court

* "That almost if not all these schools were founded *for poor boys*, must be felt from the fact of their being charitable gifts—this would be acknowledged to be the true intent of the founders, even were there no recorded testimony to prove it; but there is no want of testamentary evidence to show that the rich were not to be the recipients. The following are the donors' orders as to the class of children to be admitted to various schools in this county (Worcester):—

"Abberley, p. 5, poor children; Astley Abbot's, p. 10, poor children; Badsey, p. 10, poor children; Bengeworth, p. 15, poor boys; Birts Morton, p. 34, poorest children; Blockley, pp. 36, 37, poor children; Bredon, p. 40, poor boys; Broadway, p. 45, poor boys; Bromsgrove, p. 53, boys whose parents should be of the meanest degree or ability; Cathedral boys, p. 70, were to *be fed*, therefore must be poor; Chaddesley, p. 98, the gift was for the relief of the poor, and the education of free children; Cropthorne, p. 113, poor children; Cutnall Green, p. 117, poorest children; Droitwich, the boys are clothed, therefore must be poor; Dudley,

of Chancery;* some complain of their visitors and trustees; several desire to be supplied with well qualified assistants; the greater part approve of public examination, and of bonâ-fide certificates; some are not averse to Government inspection, or to inspection under some central body; several complain of the smallness of the stipends, while a few deprecate any change in the present state of the law.

Ledbury G. S.
Liverpool M. I.
Rev. A. H. Wrattislaw.
J. Phillips, F.R.S.
C. Babbage, F.R.S.
Rev. J. Brown.
A. Henfrey, F.R.S.

The more carefully we have considered the question of endowed grammar schools, the more do insurmountable difficulties seem to beset it. Great and sweeping changes, effected by legislation, unless in very extreme cases, are abhorrent to the feelings of the people of this country.

The Rev. J. W. Inman, head master of the Grantham Grammar School, says,—

"The utmost, therefore, you can do with them (endowed grammar schools), or induce Parliament to do with them, is this:—You may amplify that part of the instruction which is acceptable to the public. If you attempt to touch the main object of these foundations, your whole scheme will fail."

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p. 141, school and other *charitable* uses; Blue school, p. 165, poorest boys; Female school, p. 174, poorest girls; Baylies's school, p. 178, poor boys; Cartwright's schools, p. 183, poor girls; Parsons's school, p. 186, poor children; Eldersfield, p. 192, poor children; Feckenham, p. 207, poor boys; Grafton, p. 218, poor men's children; Grimley, p. 221, poor children; Hallow, p. 223, poor boys; Hampton, p. 224, poor children; Hanbury, p. 225, poor children; Hartlebury, p. 246, children of *all* the inhabitants of the parish; St. John in Bedwardine, p. 253, poor children; Kempsey, p. 260, poor children; Kidderminster, p. 262, education and books free, therefore must include the poor; p. 304, poor children; p. 307, children of godly poor parents; p. 311, poor boys and poor girls; Madresfield, p. 321, poor children; Malvern, p. 322, poor children; Newbold, p. 326, poor children; Northfield, p. 329, poor children; Old Swinford, p. 330, poor boys; Offenham, p. 353, poor children; Ombersley, p. 354, poor children; Redditch, p. 359, poor boys; Redmarley, p. 360, poor children; Rock, p. 361, poor children; Salwarpe, p. 362, poor children; Shelsley, p. 364, two poor children to be apprenticed out of the scholars; Shipston-on-Stour, p. 369, poorest Protestant boys; Shrawley, p. 375, poor children; Stoke, p. 376, poorer sort of boys; Stone, p. 381, poor children—and so on to the end of the book. Wherever the words denoting poverty are omitted, the word *free* is always used as to the scholars—therefore it must be concluded that the poor were intended."—*Griffith on the Free Schools of Worcestershire, Preface*, p. xi.

* "But the most astonishing thing belonging to the whole matter of the guardianship of Chancery, is the obscure, tedious, endless, and plundering system of its trials, when equity is sought at its hands. Equity, forsooth! allowing cases to be before it for 150 years down to 11 years, that a jury could settle in a day or two! Equity! whereby it swallows up the funds left by charitable individuals for the use of poor children, to the amount of thousands of pounds! Equity! by its sanctioning one set of rules for one school, and other sets for others of the same character! Equity! by its saying one day that boarders are desirable, and another that they are not to be allowed! Equity! by declaring that a classical education is best for a commercial population, and a commercial education most fit where the funds are sufficient to pay for both the one and the other. Equity! in limiting the number of scholars to forty, as at the Charter-house, Westminster, Kidderminster, and others, where the funds are sufficient to teach a much greater number, and placing no limit when the population is a mere nothing. Equity, indeed! its equity seems to exist in being as expensive, tedious, contradictory, and unpopular as possible, in almost all its deliberations and decisions."—*Ibid.* p. xiv.

The first step towards a thorough reform would be, in the opinion of some of our correspondents, to take the appointments of the head masters out of the hands of the present trustees.* And this, which of course would excite an intense opposition, is not on the ground of any proved or imputed mal-administration on their part, but simply because, in the present state of the law, they are compelled to choose their head masters from a class to which they should be no longer restricted. Or, if the selection still be left in their hands, as being the most competent local electors, it is their opinion they should be restricted in their choice to certificated candidates.

J. F. W. Johnston.
H. B. Jones, F.R.S.
H. Minton.
J. Nasmyth.
Rev. W. H. Parker.
Rev. A. B. Power.
Rev. A. Rigg.
Alfred Smee.
R. A. Smith.
Sir W. C. Trevelyan.
Professor J. Wilson.
Rev. F. B. Zincke.
W. Fairbairn.

"* With regard to the present system of electing trustees, it is quite apparent that that is one of the greatest evils of the system. For a given number of surviving trustees to have the power to elect or appoint the required full number, is only for these men to choose those with whom they are intimate, whether qualified or not for the office; this in itself is an evil, but that they should have the power to elect them for life is most injurious in its operation. And why? Because all men, holding an office for life, almost invariably are found to be blind and indifferent as to reformations; and as their correction involves no pecuniary loss in these trust cases, they absolutely become local despots. Look at the ——— case. A majority of the trustees would not grant a copy of the school scheme—would not meet a town deputation—would not meet the town council deputation—would not come to any compromise of the suit. And why? Because they knew that, let the result be what it would, not one penny would come out of their pockets. The cure of this evil would be that of electing the trustees on the same popular plan as that of town-councillors, viz.: one-third every year by vote of ratepayers. Then cures would be effected, grievances redressed, and reasonable reforms carried out for the benefit of the boys on the foundation.

"This alteration in the election of trustees would, of course, take their election or sanction out of the hands of the Court of Chancery; and this would be a great improvement, because the Court is often imposed upon in the names of parties recommended as most fit, and sent in for its sanction. Thus, look at ———: many of the governors are persons living at a distance; although the scheme only orders, that unless the proper number cannot be found in the parish, they shall not go out of the parish for them. Every person who knows ——— must be quite certain that there are many more persons in that parish fit to fill the offices of school governors than what the scheme requires; and therefore the insertion of some of the names was a sheer insult to the parish, or a preconcerted matter, to carry out certain ulterior and sinister purposes.

"As to the Court of Chancery being allowed to continue to be the guardian of these charities it is quite preposterous; nay, it is an evil of such magnitude to the nation at large, that it has become intolerable. To allow it to exercise a jurisdiction over so many educational institutions, so different in their foundation characteristics, and belonging to such differently constituted populations, is quite absurd. This Court, being considered one of equity, ought, of course, to deal out equitable laws to all its children, but what is the case? At Manchester, Tiverton, Ludlow, and other places, boarders have been abolished by the judgments of two Lord Chancellors, and one Vice-chancellor; whilst at Kidderminster and Repton they have been retained by another Vice-chancellor and in numerous other places by other orders of the Court. At many places, head-money is ordered to be charged; at many others disallowed. In some schools, the classics are ordered to be taught free; in others, the anhihilation of the classics sanctioned; and in some the boys are limited to forty: whilst in others, with smaller funds, they are not limited.

"This is not to be wondered at, seeing that the judges, in nearly all the cases, have been unacquainted with the educational wants of the particular places in which the schools are situated: and in others, they themselves having been educated in this description of school, think the system by which they have risen is the best."—*Griffith, on the Free Schools of Worcestershire, Preface*, p. xiv.

The evidence does not lead us to see on what grounds improvements are to be expected in the attainments of the class from which by law the head masters must generally be taken, until the universities are reformed. When this shall have taken place, it will no longer be a startling novelty, as it has been said by one of our correspondents, that a head master should know something of the constituent elements of the common things he handles, or of the formation of the earth he treads, or of the mechanism of the heavens above him; no more strange than to find him now well versed in the mechanism of longs and shorts. Reform in the universities, it is asserted by many, must, as a matter of necessity, precede reforms in the grammar schools.

University reform is, therefore, an essential pre-requisite to grammar school reform, because we do not believe any novel course of instruction can be worked out to any real result without a full and hearty concurrence, and a knowledge of the subjects so taught besides, on the part of the master. Some of our correspondents place no faith in Chancery schemes, or in grammar school reform.

Again, the trustees will not interfere, except in a case of gross misconduct or of palpable ignorance.* The visitatorial power has fallen into desuetude; it is never resorted to but on extreme occasions; it lives but to mar effectually any other legal redress. But they further say, Grant, on the part of visitors, trustees, head masters, pupils, and all concerned, the most single-minded earnestness of purpose, and the utmost zeal to introduce improvements into their schools, persons qualified to teach the elements of the natural sciences are not to be had.

Rev. Dr. Iliff.

The head master of one of the most flourishing schools in the north of England, we believe, writes to the Committee,—

Want of skilled teachers; and of funds.

"The great want is in teachers; books are to be found in plenty, but though we have taken great pains in the selection of our assistants, we have not had one who in any respect forwarded our views in the above matters —the teaching of natural science. Although examinations are very little test of efficiency in imparting knowledge, yet I cannot but think that if the Society of Arts, or any other body, would institute an examination for teachers of industrial knowledge, practice as well as principle, the proprietors of private schools would soon find it advisable to make engagements with qualified persons."

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* "The practice of allowing special visitors to be appointed is a burlesque, because the other duties to which they have to attend give them no time to visit the schools. How often has the special visitor (the ordinary) visited the Cathedral school of ————, to see if its regulations have been properly carried out? How often has he visited the ———— school? Once! How often has he visited the ———— school, and all the other schools to which he has been appointed? Why, not so often as the number of the schools would amount to! It is true, he has no fee or emolument for visiting, but he has permitted himself to be appointed visitor, and should therefore have fulfilled the duties of these important appointments."—*Griffith, on the Free Schools of Worcestershire, Preface*, p. xiv.

Again, if the head masters are not to be expected themselves to teach their sciences, it is asked, Where are the funds for assistant masters to come from? We may take the following as the type of this class of objections, which are very numerous. The Rev. Herbert Hill, head master of the King's School, Warwick, says,— R. Coates. T. F. Gibson. Lincoln M.I. Rev. R. Simpson. Warwick Athenæum. Woburn L. & S.I

"Supposing we, the masters of foundation schools, are willing or glad that a certain portion of time should be devoted to drawing, which is done, I do not doubt, in many schools, then, where are the funds for a drawing-master to come from? The income of foundation schools, although in the aggregate considerable, yet in almost every individual case is very small, (as may be seen by reference to the books which give the statistics,) and is really not adequate to pay the existing masters; besides which, in most instances, there is no power of expanding, no available fund beyond that which is at present used."

This is indeed a serious obstacle to all improvement. The want of a class of men qualified to teach the principles of industrial instruction, is indeed a most formidable difficulty. Men who are acquainted, even in a very humble degree, with the principles of mathematics and of physical science in their practical applications, or with natural and experimental science, can always profitably dispose of their time. Persons who are duly qualified to teach such sciences are rarely to be found; or, if found, they are with difficulty engaged. And here we may trace to its source an evil incidental to the practice, almost universal, of teaching, to some extent, Greek and Latin in all our schools, except the lowest, to the exclusion of other things useful and important.

"Let us take," says one of our correspondents,—

"The case of a youth at one of these schools. We shall suppose him to be stinted in means, and humble in talent; one for whom, at the fitting age, no suitable opening presents itself to enter upon industrial or commercial pursuits, a contingency by no means rare, especially in localities remote from manufacturing towns. Having nothing to do he is left to linger on at school —to keep out of harm's way—till he grows up, learning nothing but classics or a smattering of mathematics. Without money to proceed to college, without interest or abilities to secure an exhibition or a scholarship, without information to qualify him to take up one of those *productive professions*, which, starting into existence almost in his own day, hold out the highest inducements even to plodding mediocrity; he is driven, by the sheer force of hard necessity, to take the office of usher at a classical school, or, in some way or other, to engage in the occupation of tuition. Often disgusted with the employment he is forced to accept, in many cases insensible to its responsibilities, and regardless of its duties, with but little aptness to teach, soured in his temper because disappointed in his hopes, he goes through the daily routine of his employments in drowsy indifference or in fretful incapacity, aiming at the maximum exertion which will enable him to retain a post wretchedly paid, and still more wretchedly served. A tutor who will teach Latin, a little Greek, with a smattering of Euclid and Algebra, may sometimes be hired at lower wages than a domestic servant, or a common day-labourer."

Higher salaries required.

There is still another obstacle to the teaching of the principles of industrial science in our grammar schools. Not only would the salaries of competent teachers range much higher than those of classical assistants, but a greater staff for a given number of pupils would be required. A Latin usher will despatch a lesson in as many minutes as it may have taken the class hours to get it up.

Mr. T. Allen.

But it may be said, Granting this statement to be in a great measure true as respects the smaller schools, it would not hold as an objection against the larger grammar schools, which have ample funds at their disposal, and in which the higher salaries of teachers in science would be of very small moment. But here another and a greater difficulty presents itself,—a difficulty arising out of the present university system. Whatever diversity of opinion may exist as to the soundness of the system pursued in our public schools, considered with reference to the wants and requirements of the present day, there can be little, we apprehend, as to the efficiency and success with which it is in general worked out. Confining themselves solely to the one clearly-defined object, that of preparing youth for the universities, often virtually only for one, nay sometimes for one particular college of that university, the public schools do not suffer the unity of their system to be broken, or their attention to be distracted from the one thing requisite—to supply a body of young men, who, by assiduous training in classical learning, shall afterwards obtain high degrees at the university and fellowships in their college. With theories of education, or with what ought to be considered the most useful knowledge for youth, or with the best modes of mental training, they do not trouble themselves. Their course is clear, to follow the plans chalked out for them by their predecessors, to refer every kind of knowledge and mental power to the one standard, as to how far it will *tell* at the college and at the university examinations. Thus concentrating their powers, they secure that successful result which may almost always be anticipated from singleness of purpose combined with energy of pursuit. Accordingly we find that the great majority of those who obtain first-class classical honours at the universities, come from the great public schools. But unfortunately at the same time it does, not unfrequently, happen, that those men, so distinguished for their classical attainments, are distinguished for little else. They have made but scanty acquisitions besides; they have sacrificed the full development of *all* their intellectual faculties to the unnatural expansion of a *few*. The minds of such men, however highly but partially educated, should no more be referred to, as fairly indicating the advantages to be derived from a comprehensive system of education, than we

Excellence of public schools.

should select as models of the perfect human form, the persons of those engaged in certain mechanical occupations, who, as a consequence of such employments, exhibit particular muscles developed to an extraordinary degree.

In confirmation of this view the Rev. Dr. Kennedy of Shrewsbury well observes, in his letter to the Committee,— Rev. Dr. Kennedy.

"Of boys sent to Shrewsbury school (and the case is much the same in other grammar schools) the great majority are designed for one or other of our old universities. Their parents wish them to pursue that mixed classical and mathematical course of reading which will prepare them for university examinations. More than this; they wish them to *excel* in one or other branch, or in both; to stand as high as possible at college, to gain prizes, scholarships, fellowships. For this specific purpose they are sent to school, and very many parents do not wish the minds of their children to be diverted from these objects to a variety of other studies. They would be glad to see them as well informed and accomplished as possible; but a good preparation for college is the immediate and most indispensable requisite. Speaking then for myself (and I am sure that most other masters would say the same thing) I ought not, under existing circumstances, to *oblige* boys who are designed for college to pursue studies which will not materially promote their interests there. I ought not to do this, because the first and most express purpose of the grammar school is to prepare for the university."

To the same effect it has been observed,—

"A prudent father, who looks on education merely as a means to an end (and there are many such), the end being distinction, emolument, and almost certain advancement, if it be his intention that his son shall follow one of the learned professions, will not hesitate to enter him at one of the public schools, although he may be fully persuaded that the system there pursued is very far removed from what it ought to be. The advantages held forth are much too great to be sacrificed to mere theoretical notions. The honour of aristocratic association, the hopes always cherished, sometimes realised, that such association will ripen into the friendship of mature life, the prestige of ancient recollections, the palpable grounds of pecuniary benefit, the expectation of future distinction, justified by a long career of academic success, will always command, were the system ten times more imperfect than it is, a never-failing supply of youth from the upper and middle classes, to replenish these seminaries of ancient learning."

With respect to the second on our list of suggestions, — Conversion of mechanics' institutions into industrial colleges.

"II. The conversion of the present mechanics' institutions into industrial colleges;"

we approach the subject with much diffidence. We have received from the institutions throughout the country a great amount of information: many of the replies are valuable documents; some of them we have given in full amongst the evidence. We cannot speak too highly of the earnest spirit they evince, or of the clear and able manner in which they analyze the causes of the difficulties which so generally beset even the most flourishing of these institutions. Although the suggestion for the conversion of some of these societies, by their managers, has met with very general acceptance, much greater indeed than we could have anticipated, still the evi- Aberdeen M. I. Bolton M. I. W. Charley. Chatham M. I. W. Ellis. W. Fairbairn.

J. Flamank.
A. Henfrey.
Liverpool M.I.
G. Long.
H. Mallet.
Dr. Mac Clelland.
Sheerness M. I.
Tyldesley M. I.
Whitehaven M. I.

dence before us leads to the conclusion, that whenever the thing came to be put into practical operation, difficulties almost insuperable would arise to hinder the success of such a project, even in the case of institutions most warmly in favour of progressive improvement. The Council must be aware that most of the societies usually called mechanics' institutions have changed, from the force of circumstances, their objects and character. Mechanics' institutions are no longer institutions for mechanics; some enrol a small number of artizans, while others reckon none at all. Professor Johnston, of the University of Durham, states to the Committee,—

"In so far as the mechanics' institutions as a body are concerned, I do not think you will ever be able to convert them into efficiently working industrial schools, or schools of practical science. In some of the large towns you may succeed, but in the smaller places both their past reputation is against them and their actual condition. The working men rarely form the majority of the members, and in many places, as in Durham for example, and I believe in Carlisle and other places, I could name them working men's societies in various forms, which separate themselves distinctly from the mechanics' institutes."

These institutions were started somewhat in advance of their time: they were designed to lecture men on literature and science, many of whom could neither read nor write. The committees which manage these institutions complain, several of them, to us, that even now the want of elementary instruction is the great obstacle to improvement. Had they not been taken up at the time by another and a somewhat higher class, they must inevitably have been closed. Though still called mechanics' institutions, they are places of resort for the tradesman, the shopkeeper, and the middle class generally of the neighbourhood; they are places of improving relaxation, where people go in the evening to be amused, instead of to the public-house or to the provincial theatre; they go to hear a discourse

Mr. Waterhouse.

delivered by some popular and effective lecturer, or to read the newspapers and periodicals. The great features of nearly all of them in their present form we find to be news-rooms and lectures: the former are very generally in a flourishing state, and the institutes' committee, when they bring forth the scheme they are at present engaged upon, we have little doubt will give satisfaction to the institutions in union with the Society of Arts. The directors of mechanics' institutions are sometimes censured because they do not discountenance light and trivial lectures, and introduce class-teaching, or systematic courses of lectures on important subjects. Now, such complaints are scarcely just; the managers, out of voluntary and fluctuating subscriptions, have to meet the covenanted and fixed charges they have become responsible for. They are therefore compelled to choose, not what is best, but what will pay best; the subscribers require amusement—the directors must provide it.

M. de Cocquiel, in his report, gives a very full account of the origin and primary objects of the mechanics' institutions of this country. He says,—

"In their outset, therefore, mechanics' institutions were institutions for professional instruction to the adults of the working classes; their object was to instruct operatives in the arts which they practised, and especially to initiate them into the sciences applied to the industry of the locality.

"The preamble of the Manchester Mechanics' Institution, founded in 1824, points out this fact, and demonstrates its utility. in the most felicitous manner. This preamble is an important document in more than one respect, since it proves, first, that even then the necessity of scientific knowledge was well understood by the English operatives; and further, because it is a complete programme of a good system of professional instruction:—

"'The Manchester Mechanics' Institution is formed for the purpose of enabling mechanics and artizans, whatever trade they may be of, to become acquainted with such branches of science as are of practical application in the exercise of that trade; that they may possess a more thorough knowledge of their business, acquire a greater degree of skill in the practice of it, and be qualified to make improvements, and even new inventions, in the arts which they respectively profess. It is not intended to teach the trade of the machine-maker, the dyer, the carpenter, the mason, or any other particular business; but there is no art which does not depend, more or less, on scientific principles; and to teach what these are, and to point out their practical application, will form the chief objects of this institution, &c. &c. The mode in which it is proposed to accomplish these purposes is, in the first place, by the delivery of lectures on the various sciences, and their practical application to the arts. Of these lectures mechanical philosophy and chemistry will, of course, be leading subjects; and when their general principles and those of other important sciences have been made known, more minute and detailed instruction upon particular branches of art, will form the subject of subsequent lectures. It is intended that a suitable library shall be formed for circulation and reference, and that there shall be a collection of models and instruments, together with a chemical laboratory. It is hoped, also, that instruction may be given in the elements of geometry, in the higher branches of arithmetic, and in mechanical and architectural drawing.'"

"In this programme of popular instruction the line of demarcation between professional instruction and apprenticeship is clearly traced. The object of apprenticeship is to fashion the fingers, to bend the body and the muscles of man to certain kinds of work, to imprint on his mind, but even more, if we may be allowed the expression, on his flesh, certain practice. Professional instruction addresses itself much more to the mind; it tends above all to give the reason of things; it leads the industrial worker of every class to reason upon what he does, and therefore to do it better.

"Owing to successive modifications, it has come to pass that mechanics' institutes have neither the same principles as formerly, nor do their members belong to the same classes of society.

"The lectures are now only given for the amusement and recreation of those who attend them. The original plan consisted in giving complete courses on the various branches of the sciences; it was contemplated to follow these by examinations intended to verify and to stimulate the progress of the auditors. Then, as many as ninety lectures were delivered on one branch of natural philosophy. Now-a-days, three lectures, and frequently a single one, per annum are given on the same branch. This may be sufficient to while away the leisure time, and to satisfy the curiosity of some, but it is evident that such a mode of proceeding can exert no useful results either upon the workman or upon the industrial pursuits to which he devotes

himself. I do not wish to depreciate mechanics' institutions; they deserve in many respects the encomiums which have been lavished upon them.

"It is interesting to inquire into the causes which have transformed the working man's institutions, and which have thus diverted them from the path which they had chalked out to themselves.

"The mechanics' institutions are private associations, which are only kept up by the subscriptions of their active members and the liberality of some donors. The directors of these establishments consequently exerted themselves to attract the largest possible number, and the bait of amusement rather than of useful knowledge, appeared to them likely to attain that end. Hence the scenes of ventriloquy, the lectures on animal magnetism, and other entertaining subjects, and the dancing and musical parties. Unfortunately, in proportion as the number of the members increased, the average time which each belonged to the institution diminished considerably.

"Under this state of things, useful lectures upon the arts and manufactures became impossible. The lecturers being paid liberally, the lectures formed the heaviest items of the expenditure, it was impossible to incur considerable outlay for the small minority who were still in quest of useful knowledge; it was necessary to pander to the majority, under penalty of seeing the institution closed. In every mechanics' institution I have visited, I have been invariably told, that the members no longer wished for lectures, and that they were no longer attended unless they were of an entertaining nature.

To interfere with them injudicious.

It is quite clear, therefore, that these voluntary associations, confessedly imperfect as places of elementary instruction, do still, to a great measure, supply a want in our social system.*

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* Sir John Herschel, in his address to the subscribers to the Windsor and Eton public library, thus expresses his opinion on this point:—"There is a want too much lost sight of in our estimate of the privations of the humble classes, though it is one of the most incessant cravings of all our wants, and is actually the impelling power which, in the vast majority of cases, urges men into vice and crime,—it is the want of amusement. It is in vain to declaim against it. Equally with any other principle in our nature, it calls for its natural indulgence, and man cannot be permanently debarred from it without souring the temper and spoiling the character. Like the indulgence of other appetites, it only requires to be kept within due bounds, and turned upon innocent or beneficial objects, to become a spring of happiness. But gratified to a certain moderate extent it must be in the case of every man, if we desire him to be either a useful, active, or contented member of society. Now, I would ask, what provision do we find for the cheap and innocent and daily amusements of the mass of the labouring population of this country? What sort of resources have they to call up the cheerfulness of their spirits, and clear away the cloud from their brow after the fatigue of a hard day's work, or the stupefying monotony of a sedentary occupation? Why really very little. I hardly like to assume the appearance of a wish to rip up grievances by saying how little. The pleasant field walk, and the village green, are becoming rarer and rarer every year. Music and dancing, the more's the pity, have become so closely associated with ideas of riot and debauchery among the less cultivated classes, that a taste for them, for their own sakes, can hardly be said to exist; and before they can be recommended as innocent or safe amusements, a very great change of ideas must take place. The truth is, that under the pressure of a continually condensing population, the habits of the city have crept into the village. The demands of agriculture have become stern and more imperious; and while hardly a foot of ground is left uncultivated and unappropriated, there is positively not space left for many of the cheerful amusements of rural life. Now, since this appears to be unavoidable, and as it is physically impossible that the amusements of a condensed population should continue to be those of a scattered one, it behoves us strongly to consider of some substitutes. But perhaps it may appear to some preposterous to enter on the question. Why, the very name of labourer has something about it with which amusement

It might, therefore, be unphilosophical to find fault with them because they do not satisfy other wants which they are not adapted to supply. Great caution should be observed in making any change which might render them less efficient to work out that good which they do at present accomplish. We deprecate, too, any change that might interfere with that perfect freedom of self-government which they have always enjoyed. There is no doubt, however, that aid, judiciously afforded, might enable many of them to supply that elementary instruction, of the grievous want of which they all so loudly complain. But this aid we conceive may much better be afforded in an indirect manner, as we shall indicate in another part of our Report.

M. Arnoux. Professor J. F.W. Johnston. Lincoln M. I. Rev. F. B. Zincke.

From several of the mechanics' institutions we have received practical suggestions of much value. These we have handed over to the Institutes' Committee, whose special province it is to deal with all matters which bear upon the union of mechanics' institutions with the Society of Arts. We doubt not they will receive every attention and due consideration at the hands of that which is peculiarly an executive committee.

Bolton M. I. Henley M. I. Swansea P. I. Whitehaven M. I.

On the third of our suggestions,—

"III. The introduction into proprietary schools and colleges of a system of instruction better suited to the wants of the middle classes,"

we have very little to say. Schools and colleges of this kind are often got up by shareholders, to supply to their own children, and to those of the vicinity, an education of a better quality and at a cheaper cost than it can be procured elsewhere in the neighbourhood. These expectations are not always realized. Many of those institutions failed, and few of them, we believe, do more than meet their current expenses. The causes of their failure are at once obvious, and deep-seated: they attempted to combine the old grammar school system with a more modern one. Though their pupils might be, on the whole, better educated than those of the mere grammar-schools, yet they were instructed in knowledge, of part of which the universities took no cognizance, and of the rest they were not found so well possessed as those who had learned nothing else. Several of our correspondents observe, that these institutions would be ready to introduce into their courses of instruction any department for which there would appear to be an adequate popular demand. Their past history confirms this conjecture. They have generally shown themselves willing to conform to the pressure of the times. It is,

Proprietary colleges and schools.

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seems out of character; labour is work, amusement is play; and though it has passed into a proverb, that one without the other will make a dull boy, we seem to have lost sight of a thing equally obvious, that a community of dull boys in this sense is only another word for a society of ignorant, headlong, and ferocious men."

we believe, highly expedient that every facility should be afforded as well to them as to the endowed grammar schools to recast their present systems, and to introduce at least some of the principles of that knowledge into their teaching, the practice of which is to be met with in everyday life. We are told that aid (not pecuniary) and advice would be gratefully accepted. It is most important that such aid, if possible, should be promptly given. If we are not precluded, in a summary of evidence like this, from stating our own opinions, we would say, in accordance with those who are far more competent to form a sound opinion on this subject than we can pretend to be, that the education of the middle classes is in a very unsatisfactory state, as compared with that of the classes immediately below them. There can be, we apprehend, no doubt whatever that the instruction of the lower classes has received, within the last few years, much greater improvement than that of the class next above them. With his usual sagacity, the late Sir Robert Peel saw what was likely to happen. In his address at the opening of the Tamworth schools he said,—

Unsatisfactory position of middle class education.

Sir Robert Peel.

"I fear whilst the effort is made, and successfully made, to promote education amongst the working and labouring classes of the community, equal attention is not paid to the intellectual improvement of the class which is elevated by its position above the working and labouring classes. The middle classes of the country have not the same comparative advantages which the labouring classes have with respect to education; and, depend upon it, if that disadvantage be not removed, and that inequality as to education be not redressed, evil consequences will ensue. You will have the position and relation of great classes of the community inverted. You will have the lower classes more intelligent, possessing more of that power which results from knowledge, than the class which is above it. I think you will agree with me, that it will be a great advantage, that the children of the middle class, who are hereafter to constitute the great strength of this country, should have equal means of maintaining their relative positions, and should benefit by the opportunities of sound and moral and religious education."

Supply of the apparatus of teaching.

The next point on which the Committee asked for information was,—

"IV. Whether aid, in the first instance at least, should be afforded by supplying, at a reduced cost, maps and models, diagrams and apparatus."

Appleby G. S.
Barnsley M. I.
Hon. and Rev. S. Best.
Brymbo M. I.
Cullingworth M. I.
Derby M. I.
Kidderminster G. S.
Lincoln M. I.
Liverpool M. I.
Loughboro' G. S.
Penzance G. S.
Stein Turrell.
J. Waterhouse.
Woburn L. I.
Rev. F. B. Zincke.

This suggestion has met with unanimous approval. It is one that can be worked out with certainty; the results are tangible, the value received is manifest, its practicability has ensured its acceptance. It is difficult to overrate the value of a central establishment which would exhibit those of foreign countries in juxtaposition with our own, and supply them to schools and institutions at the lowest rate of profit for which such appliances of instruction can be manufactured on a large scale. This latter, though the most obvious, is not the greatest advantage of such a system. Much greater is the advantage that would

arise from the certainty that every new improvement, wherever made, whether in the exposition of the principles of science, or in the manner of teaching and illustrating them, would soon be made known in the remotest districts of the country. If, in the present state of things, improvements are made in books or apparatus, they take a long time before they can make their way with the public; and by the time they come into general use other improvements are made upon them, which ought to supersede them; while those which are made in foreign countries seldom become known at all. Now this arises from the want of any central body in whose unbiassed judgment the public placed reliance. They cannot trust to the emphatic recommendations of those who have a direct pecuniary interest in the sale of such articles.

Several of our correspondents suggest to us that this department is one that might with much propriety and advantage be taken up by our Society. In fact, we have already done something in this line with decided success. We refer to our shilling colour-box and to our half-crown case of mathematical instruments. The manufacturers of these articles were enabled to sell them at the low prices mentioned, only because the Council of our Society guaranteed to them a very large sale at first. At present, improved apparatus may be constructed, more perfect diagrams and maps devised, to illustrate, we shall suppose, some department of physical geography or of natural science; yet barren improvements they must generally remain, because it will seldom suit private publishers to undertake such risks, or to speculate in novelties of this kind.

Suggested that maps and other apparatus should be prepared, under the sanction of the Society of Arts.

Accordingly, we find that the public bodies who are engaged in education, such as the Christian Knowledge Society, the Board of Commissioners of National Education in Ireland, the National Society, the British and Foreign School Society, and some others, find it expedient either to publish under their own superintendence books, maps, and models, or formally to recommend those published by persons in the trade. The Committee of Privy Council on Education, although they neither publish school books nor recommend those published by the booksellers, even though invited to do so, yet virtually do recommend certain books by placing them on their schedules. This selection, judiciously and carefully made, as it usually has been, is very generally accepted by the managers of elementary schools.

At Marlborough House, too, a large collection of models and other apparatus has been provided. They are supplied to institutions and to public schools, by the Department of Practical Art, on the judicious principle to afford partial aid, to encourage but not to supersede the exertions of the public. In this way much has already been done, under the enlightened superin-

tendence of the secretary, Mr. Henry Cole, to cause drawing to become a constituent element of national education; a want more than two centuries ago pointed out by Sir William Petty, who, in his *Advice for the Advancement of Learning*, first printed in 1648, enjoins,—

> "That in no case the art of drawing and designing be omitted, to what course of life soever these children are to be applied, since the use thereof for expressing the conceptions of the mind seems (at least to me) to be little inferior to that of writing, and in many cases performeth what by words is impossible."—Page 6.

Now, if public bodies have found it the better course to issue the appliances of elementary popular education, or formally to recommend them, rather than leave the want to be casually supplied by enterprizing publishers, it would be still more necessary to adopt this course, should an improved instruction in the principles of natural and physical science be established. Because, for such there is now no suitable teaching apparatus to be had, except at a high price, and on an expensive scale. We unite, therefore, in opinion with our correspondents in recommending the Council to take this matter into their careful consideration.

Objections to this proceeding. A. Smee. H. Watson.

We must not, however, omit to state the views of some of our correspondents who warn us not to undertake to supply the apparatus of a system which has yet to be developed, who say, that in the present state of things, if such apparatus were largely and cheaply provided, many would absolve their consciences from the neglect of industrial instruction, by furnishing themselves with complete sets of "maps, models, diagrams, and apparatus," that while they were new and the novelty lasted, they would be admired, handled, nay perhaps lectured upon; but that after a time, when they had ceased to gratify curiosity, or to minister to display, they would be thrown aside as lumber, mementos of ill-directed zeal in a good cause. They still further say, that nothing but an actual living system, developing itself from day to day like an organized body, could adequately supply the deficiencies already existing in our present systems of education, and which must necessarily spring up in any system, however perfect it may be at first.

Instance the case of museums.

As a further confirmation of this view, they point to the numerous museums of the country, the apparatus of the sciences of geology, mineralogy, and natural history. Public bodies and municipal corporations, say they, with commendable liberality, provide museums of natural history, botanical gardens, and zoological collections for the use of the public. They are frequented while the novelty lasts, they are then deserted, or they become places of resort for the listless and the idle. But the public are not to blame for this: they know nothing about

geology or natural history, and therefore they take but little interest in such collections, which are merely the illustrations of their principles. As well, say they, place colours before the blind, as scientific collections before the ignorant. The man who never heard of geology cares but little about cabinets of fossils; to him they are merely heaps of stones.

Preparation of text books.

As bearing on this portion of our Report, it is proper to state, that we have received suggestions from several quarters pressing on us the importance of having good manuals and text-books, compiled under the sanction of, or approved by competent authority; and, as far as possible, having a direct reference to the maps and diagrams spoken of above. This suggestion demands the most cautious consideration. While we recognize to the fullest extent the great excellence of most of the books written expressly for the use of the Commissioners of National Education in Ireland, we cannot, on the other hand, deny that taken in its full breadth, the principle is by no means a sound one to hire persons to write works to order. Rare exceptions do not invalidate the rule, that bespoken books are bad books. An author who writes, not because he is full of his subject, or that he believes he can place old things in a clearer light than they have been placed before, but as a task, to earn a certain remuneration, is very likely to write a bad book, however great his talents, or however successful his previous efforts may have been. Many persons imagine that to compile a good elementary treatise, but little more knowledge of the subject is required than is shown on the face of the book. This is not so: to write a good work on the elements of any science, demands a profound knowledge of that science; and along with this, there must be that sort of duality of mind which can divest itself at will of the knowledge of the man, and put on the ignorance of the child. It must not be forgotten, that the true principles of a science are amongst the last things belonging to it investigated and understood; its truths are not discovered in the order in which they are taught. A science is built up—so to speak—a rude and shapeless pile. It is only when the mass becomes imposing from its magnitude, that men begin to think of symmetry. They then supply defects, and remove what is superfluous. They adorn its exterior, and shape it into form. The Pyramids of Egypt, we are told, were finished downwards from the top.

Mr. Williams. Rev. B. Zincke.

Defined courses of study.

On the value of our fifth suggestion,—

"That systematic and defined courses of study be recommended,"

the expression of opinion has not been very general. We are not surprised at this: it is a principle virtually involved in another

of much wider application, and its value would altogether depend on the manner in which it might be carried out. It is difficult, therefore, to express just abstract opinions on a matter which is itself not abstract, but practical. It is a matter of detail, a very important one indeed, which bears on the principles involved in our seventh suggestion, the holding of public examinations. Suffice it here to say, that to provide systematic courses of study for places of education, and to enjoin that they be carried out, without making any effectual and working machinery by which they may be brought into, and retained in operation, would be to perpetuate a delusion, that of making reforms on paper, without at the same time providing adequate means to work them out. To speak of the responsibility of Boards of Trustees, or of Corporations, or of high official personages, in matters which are not implied in their primary duties, but which are external to them and annexed, is to use a form of speech without meaning. Where the consequences of neglect of duty are not direct, prompt, serious, and personal, responsibility is but a name. Personal responsibility scarcely attaches to those high and honourable men who, by virtue of office, are constituted Trustees of the National Gallery or of the British Museum. Boards made up of numerous official and semi-official personages are the breakwaters behind which incompetency and ignorance too often take shelter.

n prizes and other honorary rewards.

The next suggestion thrown out for consideration was as follows,—

"VI. That something in the nature of a system of prizes, exhibitions, or scholarships, be provided. Innumerable rewards exist at present for the cultivation of classical learning: why should there not be some for the promotion of industrial knowledge?"

Mr. Felkin.
Mr. Fisher.
Mr. Flamank.
Rev. Dr. Penny.
Rev. Dr. Strange.
Appleby G. S.
Rev. J. Barlow.
Hon. and Rev.
S. Best.
Bodmin G. S.
J. Boswell.
Bowes G. S.
J. Clutten.
Derby M. I.
Grantham G. S.
Leicester C. S.
Liverpool M. I.
H. Mallet.
Professor Phillips.
Shrewsbury S.
J. T. Clay.
W. Crum.
A. Smee.
W. M. Williams.
Rev. F. B. Zincke.
Sir W. C. Trevelyan.

Much diversity of opinion has been expressed as to the value of this suggestion. While a great number of our correspondents speak of it in the highest terms, others, on the contrary, whose opinions are entitled to grave consideration, make light of inducements of this nature. While some dwell on the principle that men should cultivate knowledge on higher grounds than the mere hope of honour or reward, others take the more practical view, that the hollowness of such rewards as medals and prizes is quickly seen through, and that they very soon become objects of contempt. To this effect Sir W. C. Trevelyan observes in his letter to the Committee,—

"With regard to the question of prizes, it seems to me doubtful whether any further prize is desirable in the department of industrial instruction than the very substantial one of the meritorious student or candidate succeeding in obtaining remunerative employment, which will probably be the aim of the greater number of the students in these branches.

"This class of studies is not like others alluded to, which often do not lead to remunerative employment, and which consequently require such additional incentives as prizes to induce the continuation of those studies, which, however, in the case of industrial instruction is not necessary."

Scholarships stand on a different principle.

The question of scholarships or other pecuniary aids to enable students to cultivate, to still higher perfection, the talents with which they show they have been endowed, stands on a different ground from that of prizes, medals, or other purely honorary distinctions. The principle on which a scholarship is granted is entirely different. Here the State invests a sum of money, to secure for the public the full development of a talent with which the Almighty has endowed the possessor, precisely in the same way as it would purchase, or otherwise secure for the benefit of the public, a patented article of general utility. Genius is patented to its possessor by a Power higher than patent laws. As in the latter case the benefit of the patentee is not the cause which prompts the purchase, so likewise we must not assume it to be the case in the former. Those persons, therefore, who argue that scholarships given for merit at the public expense are unfair in principle, because the public at large are taxed for the benefit of a few, appear not to take a logical view of the question: that the investment is a contingent speculation must be granted.

That such inducements as rewards, honours, and prizes do stimulate the cultivation of certain departments of literature and science cannot, however, be denied. To what is the excessive study of the classics at the universities due, but to the exhibitions, the scholarships, the prizes, and the fellowships which with certainty await and reward proficiency in them? If the general prevalence of higher motives be asserted, how is the comparative neglect of Hebrew, Syriac, and Hellenistic Greek to be accounted for? There are high religious inducements to such studies as these. Again, not one scholar in ten thousand turns his attention to Rabbinical literature, which has been found so often useful in illustrating the Bible. The reason is a simple one—there are no rewards for its cultivation.

In the Oxford University Report it is stated, with no less force than truth, that barren studies will not be pursued.

"Experience," say the Commissioners, "experience enables us to discern some at least of the causes of this failure. There were no substantial benefits to be gained, even by the most brilliant success at the public examinations. It has been found in our time that the attempt to encourage the study of mathematics in Oxford has hitherto failed, in a great measure, because mathematicians, as such, are rarely elected to open fellowships. The honours, however, awarded to this study in the public examinations with the scholarships founded to encourage it, do secure its being pursued by a small number of students. But there were no honours awarded in the examination instituted by Archbishop Laud; and the failure of his scheme was eventually as com-

plete as the attempt lately made to promote the study of theology by a mere examination without honours or advantages,—an attempt which has resulted in the annual appointment of three examiners, but which has produced little more than three candidates in the ten years which have passed since its establishment. . . . *To render a system of examination effectual, it is indispensable that there should be danger of rejection for inferior candidates, honourable distinctions and substantial rewards for the able and diligent, with examiners of high character, acting under immediate responsibility to public opinion.*"*

And again,

"The stimulus of the examination for honours is found to be very strong. The average number of candidates for honours in classics is not less than 90 out of nearly 500 candidates for a degree. Of these 90, about 10 obtain a first class. This honour then is no mean distinction. That it has been honestly and deservedly awarded is proved by the confidence which the examiners for the most part enjoy, and by the success in after-life by those who have won it." †

The seventh and eighth suggestions were,—

Certificates of merit.

" VII. To hold public examinations at certain central localities for the purpose of awarding such prizes.

" VIII. To award to candidates who should distinguish themselves certificates of different degrees of merit. Such certificates, if carefully awarded and after due examination, might be made, as all analogy shows us, of great importance."

Aberdeen M.I.
T. H. Bastard.
Aynho G. S.
Hon. and Rev. S. Best.
Boswell, J.
Bridgwater G. S.
Bowes G.S.
CullingworthM.I.
Bodmin G. S.
R. Coates,
W. Fairbairn.
W. Felkin.
H. Bence Jones.
Grantham G. S.

These suggestions have met with the most cordial and unanimous approval from all of those persons who did us the honour to communicate their views. Indeed, most of our correspondents would be disposed to attach but little value to any scheme for the promotion of instruction, however excellent in theory, which did not comprise a perfect working machinery of systematic examination as an integral part of the plan. To overrate the importance of this feature is impossible. Professor Liebig of Giessen, in a communication published by the Oxford University Commissioners, thus writes,—

" Giessen, 2d December 1851.

Highly approved of by Baron Liebig.

" It is not possible for me at this moment to give you an explicit answer to the question you propose, and to give full reasons for my opinion. That it is a requirement of our times to incorporate the natural sciences as means of education into the university course is not, perhaps, doubted anywhere except in England; but there is only one way to promote the effectual study of the natural sciences, and that is to introduce them as subjects of university examination. Without examination all efforts are useless, and no scheme of instruction has any perceptible effect.

" I am supported in my assertion by an experience of twenty-seven years, and I can assure you that, even among our medical students, the study of natural philosophy, of chemistry, and of zoology, was utterly neglected until we determined to divide the examination of these students into two, namely, a previous examination in the natural sciences, and a second examination in them proper to the medical department. When I assure you that for twenty

* Report of Oxford University Commission, p. 59. † Ibid. p. 64.

years no medical student at Giessen visited the laboratory, this is a full and sufficient proof of what I say. But immediately after the examination was introduced the students pursued their studies with zeal and ardour. I repeat it—if no examination is introduced, the best schemes will fail, and will produce no effect; introduce the examination, and all the rest follows of itself. This leading point must first be determined." *

Evidence on this point concurring.

The evidence which has reached us from various quarters on this question confirms in a remarkable degree the grave authority of Baron Liebig. We are told, and we entirely accord with the opinion of our correspondents, that however excellent in theory any proposed plans of instruction may be, and however successful their working may appear to be at first, they will, after a time, fall into disuse, unless they be kept up to the mark by periodical examinations. The giving of merely honorary prizes, such as books or medals, is deprecated by some. Being necessarily limited in number they must be conferred on relative, not on absolute, merit; they foster jealousies, and are sometimes the cause of just dissatisfaction. Besides, their influence for good is transient. To confer, after careful inquiry and searching examination, certificates of different grades, seems to be free from every objection of this kind. If given with great care, fairness, and strictness, by boards of examiners whose standing in public opinion would save them from the imputation of partiality, and whose interests would not allow them to decide loosely, they might be made most important adjuncts in promoting those habits which ought most to be cultivated in youth—self-instruction, voluntary labour, and self-examination. But as matters now stand, in the vast majority of cases, for the youth who is not intended for the universities the incentives to exertion are as few as they are feeble; there is nothing to urge him to persevere with unyielding energy in a course of laborious and tedious study. He may thirst for knowledge for its own sake; but this, constituted as we are, is not sufficient. There must be something to set before him—some scope—some object to aim at—a goal at which he must arrive within a given time. He knows, indeed, that he must remain at school for a certain period, and then proceed to business; but he cannot discover how his diligence there can have any perceptible effect upon his future prospects, in matters having so very few points of resemblance as literature or science with commerce, ignorant of the fact that success in each is achieved by the same instrument. He thus necessarily contracts habits of listless inattention or of confirmed idleness. Now, were he certain that on leaving school he must go before an impartial tribunal, and there be subjected to a searching examination, and compared with boys from other schools, that his

Leicester C. S.
Liverpool M. I.
Penzance I.
S. Turrell.
Rev. F. B. Zincke.

* Report of Oxford University Commission, p. 124.

attainments and knowledge would be there brought out fully and impartially, what a powerful motive to exertion would be at once supplied, what a spirit of patient industry and enduring perseverance would in this way be fostered! Above all and beyond all, habits of self-instruction and of self-development would be indirectly but gradually formed, far more valuable in their final results than any amount of school acquirements; habits which, when their efficient causes should long have passed away, and when the very attainments they were the means of acquiring had been forgotten, would still adhere to the mind, itself, perhaps, unconscious of their origin. In this way would that self-instruction be promoted on which all real progress must be based? Schools and schoolmasters, lectures and examinations, and our whole educational machinery are useful so far as they promote this. Unless the attention is excited, and the intellectual powers stimulated through the emotions, all real advancement is impossible. If the will to work be not put in motion, splendid colleges may be built and the aid of accomplished professors secured, but barren will be the results after all. These are no mere theoretical conclusions, the facts are patent. In the magnificent and ancient halls of Oxford and of Cambridge, men the most eminent in the various departments of law, political economy, history, astronomy, and natural science, lecture to often almost empty benches. It is not that the pupils are ignorant of the great value of the subjects lectured upon; quite the reverse, yet they must not attend to them, because they will not tell upon their degree.

Confirmed by experience.

It is satisfactory to have the conclusions of abstract reasoning confirmed by established facts. The Rev. F. C. Cook, one of Her Majesty's Inspectors of Schools, in his Report for 1849, gives the following very decisive testimony,—

Rev. F. C. Cook.

"I will now endeavour to give some account of the apparent effects of the examinations and rewards for *certificates of merit* on the school teachers of my district. Those effects are as yet not more than an indication of what may be hereafter expected, and it might, perhaps, have been prudent to have deferred the consideration of the subject until the system had been more extensively tried, and been longer in operation. But while the generality of school managers, and especially the clergy, are confident that the most beneficial results are to be anticipated, and that the improvement of the schools will be commensurate with the undoubted elevation of the teachers in social position and intellectual qualifications, objections have been urged in some quarters, which cannot be overlooked, and which seem to render it imperative that Her Majesty's Inspectors of Schools should bring before the public whatever facts may contribute to a right understanding of the question. It may also be presumed that a new system may present difficulties in its practical application, and may require to be modified, if not in its principles and general framework, yet at least in some details.

"In the first place it seems scarcely necessary to adduce facts to prove that the system has acted most powerfully upon the intellectual development of the teachers. In former years I have frequently had occasion to remark that

masters who had entered upon their duties with a fair quantity of general information, and tolerably accurate acquaintance with those subjects which are usually taught in good national schools, so far from appearing to extend and complete their stores of knowledge, often fell into listless and indifferent habits, and lost much which they had previously acquired. This fact was generally recognized, and various means, but none very effectual, were devised to counteract the tendency, which of course was most obvious in outlying, desolate situations, where the agency of an energetic and intelligent schoolmaster is most needed. This result has been observed in other countries; and I may be excused for stating a circumstance which bears upon the question.

"In the short vacation which I took this summer, I spent some days with one of the oldest and most experienced educators in Germany, formerly a pupil of Pestalozzi, who has been principal of a training establishment for twenty-eight years, and has formed 600 teachers. He told me that many of his most promising pupils, whose attainments, on leaving the estalbishment, are very creditable (so far as I could judge, not falling far short of the average standard of youths trained two years at St. Mark's and Battersea), often lose the knowledge and mental cultivation acquired in the seminary, when they have charge of schools in country villages or small towns, and degenerate rapidly, either discontinuing all study, or reading in a desultory and unprofitable manner. This he attributed chiefly, if not entirely, to the absence of any external stimulus after the pupils have once obtained situations as schoolmasters. He was of opinion that all school-teachers should pass periodical examinations until they have acquired fixed habits of self-improvement, or at any rate, that they should undergo a regular examination when transferred to a new situation. It is quite evident how completely the system adopted by your Lordships meets this view. No young man of ability will rest satisfied until he has reached the highest grade to which he has any pretension—and there is little fear that those who pass such an examination as will secure a high *certificate* will ever relapse into habits of mental indolence. I have already observed more than one case in which masters who had nearly forgotten the higher subjects in which they had been prepared at the training institutions, for which they felt no direct need and found no practical application, have recommenced their studies with greater energy than ever, and have passed a fair examination. These men feel that they would have been saved much anxiety and painful exertion, had the system originally entered into their calculations.

"The effects of the system are not, however, confined to persons whose previous education or training had partly prepared them for the examination. Many remarkable instances have occurred in my district of masters who, under the twofold stimulus of hope and fear, have overcome difficulties which appeared insuperable, and mastered subjects which were quite new to them, and apparently beyond their mental grasp. Two examples may serve to encourage those who are inclined to despond. One man is the master of a large school near London. On my examination of his school, when the managers applied for pupil-teachers, I found that he was very imperfectly acquainted with his own language, did not thoroughly understand the principles of the elementary subjects which he had to teach, and, as may be supposed, was quite unable to conduct apprentices through the course prescribed by your Lordships Minutes. In fact, he was an uneducated man, who by accident had been thrown out of the position for which he was originally intended, and had been chosen as schoolmaster for his high moral character, and apparent skill in the management of children. In consequence of the remarks which I then made at the request of his superiors, he recommenced his education, which he had in fact to relay the foundation. At my next visit I found a remarkable change in him and in the school, and, after a satisfactory examination, recommended the candidates to be apprenticed to him.

This young man obtained a *Certificate of merit* at the first general examination, and is steadily advancing in every subject. The second person of whom I speak, is master of one of the largest schools in London. His early education was imperfect and mechanical. He was some years a servant in a gentleman's family, and was then appointed schoolmaster, as an intelligent and high principled man. Until your Lordships Minutes appeared, he was satisfied with what knowledge he had been able to acquire, without much exertion and without any guidance or help, in his leisure hours; and though his school was always in excellent order, and bore marks in every class of careful and diligent teaching, it was evident that the boys had not been instructed upon a well-digested system, and that they were especially deficient in a knowledge and applications of first principles. This master attended classes, bought books, worked diligently with his apprentices, and at the first trial obtained a *Certificate of merit.*

"These are, perhaps, extreme cases, but the instances are frequent of men who have had to supply very considerable deficiencies, and have succeeded on a second trial. Nor are the effects by any means limited to those who have hitherto succeeded, or even come forward as candidates. I believe that all the masters under fifty years old, who have apprentices, are preparing for a future examination; and many of them have told me that, whether they succeed or fail, they have derived the greatest benefit from the knowledge which they have already acquired."

To the same effect Mr. Morell, another of Her Majesty's Inspectors, thus records his experience in his report for the year 1850, p. 770,—

"The influence of these examinations has been very considerable throughout the country, in stimulating teachers of all classes to self-improvement. The field of study opened by them has appeared to some to be too extensive, tending to encourage a superficial acquaintance with a great variety of subjects, rather than a thorough knowledge of any one. This has been, however, in a great measure unavoidable, owing to the want of early education under which many of the candidates have laboured. So soon as a satisfactory acquaintance with elementary branches can be taken for granted, or seen to be involved in a higher knowledge of a few specially important subjects, the number of the subjects could be easily curtailed, and a more complete investigation of them demanded. I cannot, however, refrain from bearing testimony to the zeal with which the teachers generally, amidst various disadvantages, and with arduous employment already on their hands, have applied to the work of preparation; how perseveringly they have endeavoured to overcome every obstacle; how successfully they have in many instances laboured for the prize; and how cheerfully in others they have borne a present disappointment for an ultimate good. The moral lessons thus learned cannot, I think, be lost either upon themselves or their pupils."

Examination no sure test of proficiency, how answered.

G. J. Bompas.
I. T. Clay.
J. Mac Clelland.

Objections are sometimes made to examinations, that they cannot always be depended upon as true tests of proficiency—that they give rise to *cramming,* and to superficial preparation. Now, there is no system or plan that ever was devised which does not stand in the shade of some one or other objection. It is true that candidates so prepared may and very often do pass, nay, sometimes with credit, examinations apparently very difficult. This, however, is no argument against examination as a test; it only proves that the examiner is incompetent to discharge his duties. To be a good examiner requires previous

training. A well-trained examiner, who *knows* the subject in hand, will not only gauge the knowledge, but will take true note of the faculties of those who come before him. While he who confines himself to what is set down for him in text-books, who makes no step in deduction, who inquires into mere facts, and not into the bearing of these facts, who does not seek to look at a truth from different points of view, mistakes the duties of his office, and leaves undeveloped the powers of the instrument in his hands. An examination should not consist of strings of leading questions, nor of interrogatories to be answered by a simple yes or no. Neither should the answer be the echo of the question, nor should familiarity with mere tabulated results be sought for. An examination should be something more than the exponent of the strength of a mechanical memory. Examinations of this kind, if they do some good, do more harm. They encourage those principles of association, which rest on verbal similitude.

The Rev. C. Merivale, late Fellow of St. John's College, Cambridge, says,—

"Without presuming to give the details of the system I would recommend, I venture to urge, that the object to be attained is a *full, searching, and methodical examination** of the classical students three times at least in the course of their three years. In order fully to check or bring out the merits of the modes of instruction they have been subjected to, the examination in every case should embrace translations, composition, and questions on paper concerning vivâ voce writings of essays, and much personal communication between the examiner and the examined. . . . . *I would try to reduce examination to a science.*

"I have said enough to indicate what I consider the great object to be attained, namely,* *a thoroughly scientific system of examinations.*"†

It is asserted, too, on high authority, that the value of examination as a test is lowered by the too exclusive use of written papers, and of answers in writing to set papers, so much in use at the present day, in some cases to the total exclusion of the older methods of oral or vivâ voce examination. If it be found a powerful test of comprehensive and philosophical knowledge, of the graphical properties of space in geometrical investigations, and of the complicated formulæ of a refined analysis in physical researches, it must be still more effectual in testing a knowledge of law, of history, of geology, or of mineralogy. Mr. W. Hopkins, late President of the Geological Society, in his answers to the inquiries of the Cambridge University Commissioners, thus gives his opinion,—

"Vivâ voce examination might be made the means, undoubtedly, of drawing forth other and in some respects higher qualities in our students than those encouraged and elicited by written examinations alone. This would show itself more especially in the higher class of students; and from a long

* Thus, in the original. † Cambridge University Report. Evidence, p. 176.

acquaintance with that class I am fully convinced, that however necessary and efficacious written examinations may be in encouraging and testing an adequate acquaintance with mathematical reasonings and processes, and their applications to the solution of individual problems, examinations vivâ voce afford the surest test of that higher intellectual power which enables a man to take comprehensive and philosophical views of mathematical and physical science, and prepares him to grapple with its highest difficulties. I have already stated my confidence in the general determinations of the relative merits of our candidates, according to our present examinations; and I have no doubt that the results of the two modes of examination of which I am speaking would, when applied to our higher students, be in accordance with each other in a great majority of instances. At the same time, I have been acquainted with a considerable number of cases in which, I have no doubt, these results would have been different; and judging not only from my own impressions at the time, but also from the subsequent careers of the persons alluded to, I believe that in almost every instance the examination vivâ voce would have supplied the higher intellectual test."

And again,—

"The character of the French elementary works, usually written by the most eminent mathematicians, is exactly the reverse of our own in the points above mentioned (perspicuity in details), as is also their system of examination, which, I believe, is entirely vivâ voce. It has always appeared to me that something intermediate would be preferable to either of these systems."

To the same effect, the Rev. W. G. Humphrey, Fellow of Trinity College, Cambridge, writes,—

"I wish to direct the attention of the Commissioners to a defect, which is comparatively of recent date, in the system of the university. I have long regretted it, and especially since I have ceased to reside at Cambridge; every year's experience and reflection has more fully convinced me of its importance. I refer to the absence of oral examination, without which no educational system, in my opinion, can be complete. Mere written questions, however carefully framed, do not always enable the examiner to ascertain whether the candidate really understands the subject, nor to search the full extent, nor to test the accuracy of his knowledge, nor to judge as to the quickness of his perceptions, the *readiness* of his memory, and his power of producing what he knows on the spur of the moment, qualities which, being of so much use in manhood, ought to be encouraged, developed, and rewarded in youth. For this purpose the university should give full scope to them in her examinations; and this, I submit, she cannot do without the vivâ voce system."*

Early removal from school the most hopeless feature of the present day.

But even if our courses of instruction and our systems of education were all that their most ardent admirers profess to believe them to be, still, men have lost confidence in them; the most favourably disposed doubt of them. The most *hopeless* feature of the present time, that which is most discouraging, others would say the most alarming, is, the yearly diminishing stay which boys are permitted to make at school. From the age of 17 to 16 to 15 to 14, down to 11, nay even to 10, the duration has gone on diminishing. The improved value of juvenile labour is one cause of this, but it is not the only cause, nor the most pressing cause.

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* Cambridge University Report. Evidence, p. 286.

The more telling one is this. Parents are beginning less and less clearly to discern the bearing of the meagre and stationary instruction of the day on the multiplying and progressing objects which are hourly inviting attention. Unless some effectual stop can be put to this evil, other improvements, however well devised, will lead but to little permanent good. The system shall be perfect, the school-house shall stand wide open, the master shall be ready to teach, but the pupil will not be there.

Professor Moseley does not overrate the evil, when he says,— Professor Moseley.

"The early age at which the children are taken away from school is the *great* discouragement of the friends of education; it is the *hopeless* side of the question. No other obstacle appears to them altogether insurmountable but this."

The Rev. F. Watkins, another of Her Majesty's Inspectors, reports the evil, and thus notices its increase,— Rev. F. Watkins, H.M. Inspector of Schools.

"The next point of especial importance is one which I have, on other occasions, brought under your Lordships' notice, viz., the constant gradual diminution of age in the children attending our national schools. There can be no doubt that the effect of that part of the Minutes of 1846 which regards the apprenticeship of pupil-teachers is to increase the duration of the children's school-time by the prospect which it holds out of a comfortable provision and an honourable position in life. But this position can be attained only by a small number, according to the first constitution of the Minutes, by four per cent., and under their present administration by only two and a half per cent., of the children of a school. The stimulus, therefore, given by them to a longer stay is decreased in the same proportion.

"I regret to state that the uniform testimony of all experienced teachers (and I have consulted some who have been occupied for more than thirty years in elementary education), is, that the age of their scholars is less than it was even a few years ago, and considerably less than in the earlier years of their professional labour. I have the evidence of the masters at Hull, Salthouse-lane, Doncaster, Kirkburton, Thurstonland, and York, St. Cuthbert, all of whom have been busied in important schools for some years, to this effect. Observant managers of schools generally complain of the same evil, and lament, not unfrequently, that the time and good attainments of the master should be wasted on little boys who would seem more properly entrusted to the maternal care of some village dame.

"The fact, I think, is indisputable as a general rule. The few exceptions to it are in schools peculiarly circumstanced, where extraordinary, and elsewhere hardly practicable, efforts have been made by managers who are either lords of the soil, or owners of mills employing the whole labour of the vicinity; or by clergymen who have not only the wish, but also, that which is comparatively rare, the ability to take such a part in the instruction and management of the school, that the children are as unwilling to leave as the parents are to withdraw them from it. It has been the fashion to say that this generally short stay of children proceeds from the indifference of the parent to his child's right education. I do not believe this to be often the case."

To the practical character of the instruction given in the schools of the Dean of Hereford is their great success mainly owing. The instruction given is worth paying for, and worth staying for. The Dean observes with great truth,—

"Where there are improved schools the parents will gladly send their sons to a much greater age than the common labourer can do; many of

them would remain to an age, and be well qualified for the lower departments of the public service; and it would offer great encouragement to education and to our schools if those having the patronage of such places would occasionally seek to fill them up from those of fitting age and acquirements, and of good character, in our parish schools. Government might even go a step further, and with great advantage to the public, and introduce a moderate and reasonable educational test for such places as post-office messengers, door-keepers, messengers, &c. in the public departments; such a test as to be able to read well and to write correctly from dictation, with a little knowledge of arithmetic. Requiring of young candidates for such places a school certificate of good conduct might be most useful."

And again,—

"There is also another point of view in which our national schools have of late years been an obstacle to general education rather than a good; the low standard of instruction adopted in them has made the class just above the labourer (but who cannot send his children from home), look upon our parish schools with a sort of contempt, as places to which they could never think of sending their own children."

And the case is becoming very little better, even as regards the middle classes. A writer, who has bestowed a considerable amount of labour on the investigation of this question, and who has had peculiar aids towards the formation of a sound opinion upon it, thus states his conviction,—

"Of all the evils which beset the education of the middle classes, this is, perhaps, the one that calls most loudly for removal. Unless this defect be repaired, other reforms are comparatively valueless. What is the use, for example, of providing new schools, or a better class of teachers, or improved systems of instruction for those who will only partially, at best, avail themselves of them? Is it possible, with the aid of any machinery, however perfect, to impress, in three or four years of thoughtless childhood, the whole 'form and pressure' of the abiding character of the man? or to draw out and permanently fashion, in the mould of enduring habit, those faculties which it is the primal function of education to mature and to educe?"

The complaint is general, and is nowhere contradicted. Unless, therefore, we can succeed in proving to the public that the instruction given in our schools bears somewhat more directly on the future prospects of youth than our present procedure, the evil will continue unabated, or it may possibly be aggravated.

But, however opinions may differ as to the cause, the effect is certain; and so long as this inveterate evil continues, any considerable amount of improvement may be looked upon as hopeless. Now, for this admitted and loudly-deprecated evil, the examination suggested by several of our correspondents would supply a thorough, prompt, and universal remedy. Although a parent might despise even the best improved education, and deny its most acknowledged advantages—though he might ridicule learning, and look with suspicion and dislike on the examination by a central board of examiners, as a vexatious though indirect interference with his freedom of action —yet, from the consideration that the future progress and

success in life of his son might depend on his obtaining the examiner's certificate, he would feel reluctantly constrained to permit him to continue under instruction, to qualify him to pass his examination.

If it be admitted then that such would be the practical working of a system of this sort, it is easy to see how wide a field would be at once opened to voluntary exertion; for, if the usual duration of school attendance were increased by a fourth, or by a fifth, it would be equivalent to an augmentation of the whole number receiving instruction in middle-class schools by a fourth or by a fifth; this is evident. Now, such a sudden increase would not only fill the schools at present in existence, but would require, especially in populous places, additional school accommodation, more teachers, and those of a higher grade, improved apparatus, &c. All this would afford a broad scope for private action. How much would it not widen the sphere of voluntary exertion!

Were, however, a higher degree of proficiency insisted on by the examiners, the duration of school attendance would necessarily be still further prolonged; nor would the real starting point of a youth in life be retarded on that account—for no sensible employer would choose the services of a raw, uneducated lad—mean in their character and limited in their range, as they necessarily would be—in preference to the assistance and judicious co-operation of a young man of well formed character, education, and intelligence.

Remedy for this state of things suggested.

Aberdeen M. I.
Bodmin G.S.
G. J. Bompas.
H. Bourne.
R. Coates.
Derby M. I.

Exhibitions or scholarships, to be followed at the termination of the course by certificates of different grades, would go further than any other plan that could be devised to mitigate this state of things. A limited and partial experience of the great advantage of certificates granted in this way, clearly indicates what the working of a well-contrived measure on a large scale would be. The Edinburgh School of Arts issues certificates of merit, awarded after strict examination. In a report of this institution, published some sixteen years ago, the value of such certificates is thus clearly stated,—

Edinburgh School of Arts.
W. Fairbairn.
W. Felkin.
J. Hogg.
J. MacClelland.
J. Nasmyth.
J. Phillips.
A. Schofield.
R. A. Smith.
Rev. F. B. Zincke.

"A certificate obtained by a course of study like this, and after examinations so searching and complete, is unquestionably one of the highest and most flattering testimonials which a young man can possess. It certifies at once the correctness of his conduct, the extent of his studies, and the proficiency he has made; and, go where he may, and apply for what situation he may, this certificate of membership, obtained so honourably, must ever be his best recommendation, as well as the most powerful stimulus to a line of conduct which should support the character he has acquired. In his address to the Manchester Mechanics Institution in 1838, Sir Benjamin Heywood recommends that similar certificates be granted there; and he states that such is the confidence attached to their certificates [of the School of Arts], that an eminent engineer here says he should not hesitate at once to take into his employ anyone who brought with him such a testimonial."

Recent experience of.

Now, this was fifteen years ago. In answer to an inquiry made by one of the Committee a short time since, the Secretary of the School of Arts, Dr. Murray, writes,—

"You ask my opinion chiefly with regard to Article 8. On this subject I can speak with very considerable precision, as the system of awarding certificates of different degrees of merit, has obtained in the Edinburgh School of Arts since 1834. The following extract from one of our annual reports will briefly show you the nature of our plan :—

"'In order more clearly to show to the subscribers and the pupils the real inherent value of the diplomas of life membership, the Directors beg to specify the course of study which it is necessary to pursue in order to gain them. The range of study embraces a total attendance of three years, and of at least one year on each of the following branches, namely, mathematics, including arithmetic and algebra, recommended to be taken from the first year,—chemistry the second,—and natural philosophy the third. Those students in any one of those three classes, who choose to come for the purpose, at the end of each course undergo a *strict examination*, conducted by the lecturers generally in the presence of one or more of the Directors, and all those students who are found to possess a fair knowledge of the subject taught in any given class receive an '*attestation of proficiency;*' and every student who at the conclusion of three years attendance produces '*attestations of proficiency*' from all the classes in the prescribed course of study, receives a diploma of '*life membership,*' certifying that he has undergone a regular education at the Edinburgh School of Arts, specifying the branch of study pursued, and that he has been found on examination to possess a competent knowledge of all these subjects. Such students enjoy the privilege of free admission to the lectures at the school during life, and a right to the use of the library on paying 2*s.* annually to the institution. The value of such diplomas, the Directors repeat, cannot easily be over-estimated, both for the substantial scientific information which the possession of them implies on the part of the student, and for their direct practical bearing on his history during life.'

"At the end of our winter session last year, as a fair specimen of what takes place, I may state that 'attestations of proficiency' were awarded, after a strict examination, to—

	16	students in mathematics.
	9	,, in chemistry.
	13	,, in natural philosophy.
Total -	28	

Very many students take out 'attestations of proficiency' in one or more classes who, from change of residence or some other circumstance, never attain diplomas of 'life membership.' Last year the number that received such diplomas was only four—the previous year nine.

"There are two most favourable results that flow from our system of 'attestations' and 'diplomas.'

"1st. The students who aim at these distinctions are remarkable for regularity of attendance, for industry in the work of the class, and for exemplariness in every sense of that word. This assiduity on their part exerts a most beneficial influence on the whole of their fellow-students, and also stimulates the lecturers.

"2d. There is scarcely an instance of a young man, who possesses either 'attestations of proficiency' or 'life diplomas,' particularly the latter, who does not in consequence get on better in the world, either in the line of his own business or in some higher branch. There are many instances, not merely in this town, but throughout Great Britain, of our students filling

situations of trust and emolument, as architects, engineers, and in other capacities, who have no hesitation of acknowledging that they owe all, or nearly all, their education to the School of Art. All cannot attain to eminence, but any of our students showing their 'attestations of proficiency,' or 'life diplomas,' to an employer, is sure, or almost sure, of being at once employed."

Greenwich Royal Hospital Schools.

We will now call the attention of the Council to another institution, as an illustration of the views of many of our correspondents, and as an exponent, to some extent, of the kind of system which, in their opinion, ought to be adopted—we mean the Greenwich Royal Hospital Schools.

The Council are, no doubt, aware, that these schools are a royal foundation; that they consist of two schools, containing 400 boys each; and that the pupils are prepared for the naval service of the country, as well mercantile as royal. We think it right to draw attention in an especial manner to these schools, not because they afford us an example of an education more perfect of its kind, and bearing more directly on the realities of life, than any other with which we are acquainted in this country; nor do we notice them because they are the means of improving in a remarkable degree our naval service, both royal and commercial; but simply for this reason,—they give a practical and complete refutation of an argument which is sometimes used, not so frequently now as some years ago, to the effect, that people should not be educated above their condition, or they will become discontented with their occupations, and dissatisfied with their lot. Now, Professor Moseley's experience is very different. In his Report to the Admiralty on the Greenwich Royal Hospital Schools, in 1850, p. 24, he makes this remarkable statement,—

Professor Moseley's Report.

"It is a fact worthy of being recorded, and deserving of observation, that so long as a low standard was affixed to the education of the boys of the Greenwich schools, lest it should render them dissatisfied with the hardships of a seafaring life, they were found to be dissatisfied with those hardships, they ran away from their ships; and that *now*, when it is fixed at a high standard, they are not dissatisfied with them; they do not run away from their ships, and are more steady (as it is termed) than other boys.

"That the improved education of the boys was that which caused them to redeem their characters in the sea service is satisfactorily shown by the fact that it synchronized with it. It was in the years 1843 and 1844 that extensive changes were made in the organization of the schools, and that others yet more extensive made in the two preceding years began to be consolidated. In the year 1845 the effect of these changes on the character of the schools in Her Majesty's and the merchant service began to show itself.

And as to the character of the instruction given in these schools, the same able Inspector thus reports:—

"It appears that, during the year 1845, ships were found for twice as many boys as during the preceding year, and for between two and three times as many as during the year 1843.

"Being desirous to be put in possession of such authentic information as might be obtained of the conduct of the boys serving on board H.M. ships,

your Lordships were pleased to direct, at my request, that inquiries should be made with that view of Admiral Sir J. B. Capel, at Portsmouth, and Admiral Sir W. Gage, at Plymouth. I have before me the official returns to these inquiries, and I find recorded in them the characters of the boys of the Greenwich Schools, who entered H.M. ships at those ports from the receiving ships. They refer to 107 received on board the "Victory" and the "Excellent" at Portsmouth, between January 1, 1847, and March 31, 1850, and to 54 received on board the "Impregnable" at Plymouth, between January 1, 1849, and March 31, 1850. Against the names of all those boys (three-fifths of them) who stayed a sufficient time on board the receiving ships to justify the expression of an opinion as to their characters, I find recorded the words "good" or "very good," except three, one of whom had a "fair" character, and the two others were "discharged;" one for misconduct, and the other as unfit for the service.

"This favourable statement is fully confirmed by the information which I have received in my annual visits to the dockyards.

"The labours of the upper school begin with the elements of English knowledge, and they include (with religious knowledge, reading, writing, arithmetic, geography, and history), the geometry of the first book of Euclid, algebra to simple equations, and the use of logarithms.

"I have great satisfaction in bearing testimony to the excellent manner in which the upper school is conducted. Whilst it is far beyond any other known to me in scientific attainments, I know of none in which the different elements of an English education are more efficiently taught.

"The labours of the masters of the lower school are chiefly given to the instruction of the boys in the elements of an English education. In the second class, however, they begin geometry, algebra, and mechanics; and in the first class, continuing these subjects, they are further instructed in navigation and nautical astronomy, and are taught to observe with the sextant, and to compute from their own observations. For practical purposes, it is greatly inferior to the knowledge of the boys of the upper school; in this respect, that it does not include the mathematical principles on which those rules are founded. The mathematical studies of the lower school do not proceed far enough for this.

"Another conspicuous element in the lower school is the instruction of the boys in certain branches of practical science, and particularly in the mechanism of the steam-engine, and in the theory of the work or useful effect of steam-engines, waterwheels, men, and animals.

"The boys have shown great aptitude in receiving this instruction, and some of the most important problems in practical mechanics are now solved by them readily and with a clear intelligence of the principles on which the solution of them is founded.

"The large sectional models of the stationary, marine, and locomotive steam-engines which your Lordships have caused to be placed in the class-rooms, have rendered the explanation of their mechanism comparatively easy; and the boys are familiar with it under all its forms.

"They have, moreover, been instructed in the elementary theory of the steam-engine, and are capable of applying some of the most important elements of that theory to practical purposes.

"In the first class they have executed, in their leisure hours, and chiefly in the evenings, a great number of drawings of the different parts of those engines, and of other machines and elements of machinery. Some of these drawings I have caused from time to time to be submitted to your inspection. All of them are made with care, and some of them with considerable artistical skill.

"It was to encourage these pursuits that your Lordships were pleased to direct four of the boys of the lower school, who acquitted themselves the best, to be received every year as apprentices in the steam-factories in Her Majesty's dockyards; and it is with great satisfaction that I have learned,

from the superintendent of the steam-machinery at Woolwich, that these are remarkable among the other apprentices of that factory, for their good conduct, and their intelligence and skill.

" In recording these circumstances, I am bound to direct your Lordships' attention to the fact, that the great majority of the boys who compose these schools are the sons of sailors, and, in the lower school, of common sailors; that they have not unfrequently passed their previous lives among the lowest haunts of a seafaring population; and that they come to the institution at an age (twelve) when the influence of evil example has already begun to acquire some hold upon them, and the power of evil habits has begun to be felt. My object is simply to show what a school composed of such children becomes, when the standard of education (using that word in its most comprehensive sense) is *low* in it; and *what*, when it is *high*.

" In a letter dated 7 August 1840, addressed by Admiral C. E. Fleming, the Governor of Greenwich Hospital at that time, to the Secretary of the Admiralty, I find the following passage:—

" ' More than one half of the boys of the lower school cannot read, and, when discharged from the establishment at the age of fourteen, few, if any, are fit to enter the sea service, either in the royal or mercantile navy. Still fewer are apprenticed to trades, and all, being incapable of procuring a livelihood, become a burthen on their friends, the parishes, or are driven to obtain it by dishonest means.'—(Minutes of Council, 1840–1, p. 243.)

" Information which I have myself received confirms this statement. I have been told, on good authority, that, at the time to which it refers, there existed, among the captains of H.M. ships and merchantmen, an indisposition to take the boys, especially those of the lower school, into their ships. Ships could not, in point of fact, be obtained for them. They were accused of being unsteady, and of running away from their ships."

Of the state of these schools some ten or twelve years ago, the following statement will give some idea:—

"The 400 boys of the lower school were taught in one large school-room, by two masters, on the plan of Dr. Bell. ' The books used were the Bible, Goldsmith's History of England, the Life of Nelson, Mrs. Trimmer's Abridgment of the Old and New Testament, reading-cards, and small books of the Parables and Miracles of our Saviour. No maps were used, and the apparatus was confined to a black board, slates, and copy-books.'

" In religious knowledge ' the degree of intelligence manifested by all the classes below the first, was of the lowest and most imperfect kind.' In reading, none of the boys examined in the second class were able to give any explanation of the meaning of the words which they read; and in arithmetic they had only advanced to the rule of three.'

" ' In the first class some acquaintance with Scripture history was shown. The writing was good. In arithmetic some had advanced to fractions; and the master, contrary to the regulations, had given to this class some instruction in English grammar. No geography, however, was taught, nor anything that had a special reference to seafaring life, except ' the points of the compass.' A selected number of the class, being required to write on their slates what they could remember of some simple narratives of the Bible history, were unable, with one or two exceptions, after an hour's trial, to express their ideas otherwise than in fragments of verses from the Bible, which occurred to their memory.'

" In confirmation of this report by Mr. Tremenheere, in 1840, I find, upon reference to my own Report on the lower school, for 1843, that there were then 80 boys who had been in the school three years and upwards; out of which number there were 47, of whom none could be considered to have attained, during that time, the common elements of an English education, and of whom a considerable proportion remained in a state of gross and disgraceful ignorance.

"According to this estimate of the efficiency of the lower school, it had failed in giving the common elements of an English education to one-half of the boys who had resided within its walls more than three years."

The following observations are of peculiar importance,—

"Having described the state of education in the Greenwich schools in the year 1840, and its state in 1850, the question naturally suggests itself, whether any real advantage has resulted to the boys themselves, or to the public service, from the progress made in it during the intervening ten years.

"And the question is the more interesting and important, as it involves the results of an experiment, made at the public cost, on one of the largest schools in the Kingdom. It adds also to the interest of the inquiry, that the state of education in the Greenwich Hospital Schools, ten years ago, was very much that which is to be found in the great majority of elementary schools in the country, at the present time; and that the present standard is that which, under a less professional and scientific form, may fairly be aimed at in the education of the country generally.

"And in the first place, with reference to a moral improvement in the boys, as the result of their improved education and training, I know no more certain evidence which can be given of this than the improved state of the discipline of the schools, showing the better conduct of the boys whilst they remain in them; and their improved character in Her Majesty's and the merchant service, showing their better conduct after they leave them. I am far from attributing the moral improvement, of which this inquiry affords the evidence, exclusively to the progress which the boys have made in learning, although I believe *that* has greatly contributed to it. I attribute it rather to a higher sense of the functions of the educator, and greater zeal in the work of education, on the part of all persons in authority connected with the schools; associated, as it was to be expected that it would be, with a more profound conviction of the responsibility under which they act.

"*The spirit of the Institution is changed.*—Both masters and boys view it in a different light from what they did. The less irksome way in which instruction is conveyed to the boys, and the sense on their part of services of greater value rendered to them, have made the task of discipline more easy, and established a new and a more friendly relation between them and their teachers—and the public opinion thus won to the side of order and good conduct, within the class-rooms, has extended to the play-hours of the boys, and, it would seem, beyond the years of their residence in the school, to their entrance on a seafaring life."

Moral value of artizan improved by instruction.

Now, here is no theoretical reasoning, but hard, dry, official facts. They afford a confirmation of what hardly needs such, that men will, with pleasure, exercise that craft in which they are conscious of excellence. They like their profession because they know it. If it be a wise economy in a flourishing trading establishment, or in a large manufactory, to have all the hands, and tools, and machinery, each the best of its kind and in the most perfect working order, it surely cannot be considered too refined a policy that this country should develope all its native force of character and strength of intellect to the utmost perfection of which it is susceptible. There is no theorem in social science more clearly demonstrated than this: the value of the artizan, even in a moral view, increases with the amount of instruction he may have profitably received. The testimony on this head is cumulative, unanimous, and irresistible. There

is most valuable evidence on this point to be found in Appendix B. to the Eighteenth Report of the Commissioners for National Education in Ireland,—

"The most important evidence as to the bearing of *training* and *education* on the *value* of workmen, and on the comparative eligibility of educated and uneducated workmen for employment, is that of Albert Escher, of the firm of Escher, Wys, and Co., of Zurich, employing from 600 to 800 men in their machine-making establishment in that town, besides an equal number in cotton factories in the Tyrol and Italy. This gentleman, after *admitting* the superiority of Englishmen as workmen, *only* on account of their being trained to special branches, gives the preference for general usefulness to the Saxons and the Scotch, on account of their *superior education* and respectability of conduct.

"'The English,' he says, 'are in conduct the most disorderly—the least respectable and trustworthy of any nation whom we have employed; and in saying this, I express the experience of every manufacturer on the continent to whom I have spoken, and especially of English manufacturers, who make the loudest complaints. *These characteristics of depravity do not apply to the English who have received an education;* but attach to others in *the degree* in which they are in want of it. The refinement produced by education would be most beneficial to workmen; for in the present state of manufacturing, when so much is done by machinery and tools, and so little by mere brute labour, mental superiority, system, order, punctuality, and good conduct—qualities developed by education—are becoming of the highest consequence.' Mr. John Kempson, of Philadelphia, makes statements very similar. Mr. Fairbairn, of Manchester, observes that a preference is always given to workmen who have received the best education; and another eminent employer, who had provided schooling for upwards of 200 of his men, &c., stated that he had found it so profitable an investment, that he would not take 7,000*l.* to exchange his hands (upwards of 800 in number), for the uneducated workmen in a neighbouring factory.

"Precisely similar remarks and observations may be made regarding the employment of workmen, or of labourers generally, including women and boys, in the factories of our own country. As space will not permit the introduction of many cases, I shall content myself with one in the north of Ireland, in the county of Down, which may be considered as a fair specimen of the others. I allude to the eminent firm of Dunbar, M'Master, and Co., of Gilford Mills, who employ nearly 2,000 hands in their spinning factories, and have erected a splendid and commodious school-house, consisting of three departments, for the instruction of children—boys, girls, and infants—during the day, and for adults, and such as could not attend the day-school, in the evening. This school-house, when finished, was immediately placed in connexion with the Board, and in the several departments, of which 125 boys, 98 girls, and 61 infants—total 284—are receiving a most efficient education and moral training. At the evening schools there are at present 131 males and 81 females on the books.

"In reply to a note of mine, requesting Mr. M'Master's opinion of the value he attached to education in a mere moral and worldly point of view, and the comparative efficiency of *educated* and *uneducated* operatives, I received the subjoined letter, which I give entire, as it would suffer considerably by an extract. This testimony of Mr. M'Master is in exact accordance with the views and opinions of the other great mill-owners and factory proprietors of Belfast and its neighbourhood, and, indeed, of the entire province of Ulster:—

"'Gilford Mill National Schools, January 12, 1851.

"'Dear Sir,—In reply to your esteemed favour of 9th instant, it affords me sincere gratification to state, that I consider our *schools* the most powerful

engine we possess in connexion with our little colony, for promoting the happiness, comfort, and independence of our people, as well as the success of the concern. In fact, I look upon *education* as almost indispensable for the well-being of an establishment like this, not only from the beneficial influence which it imparts to the whole community, but also from the valuable training which the pupils receive in preparation for their various offices; and I find that the desire evinced by a scholar for learning and improvement is always a sure test of their value in the works; so much is this now felt, that when a choice hand is required to be brought up in the factory for an important post, with a view to their promotion afterwards, it is from the schools they are usually selected; and this has now become so well known among them, that it forms the chief incentive to that perseverance and anxiety to learn with which they apply themselves, particularly at the night-schools. I consider these even more useful than the day-schools, and many of our best hands owe their present success and comfort to the instruction received there.

"'Those of our people who avail themselves of the advantages of education are generally distinguished for their good conduct, steadiness, neatness, and self-respect; and I perceive them afterwards becoming attendants at our reading-room for their recreation and improvement, instead of frequenting the ale-houses.

"'There have been 1,077 pupils admitted to the *male evening* school since its commencement. There are 131 pupils at present on the books of same. There have been 724 admissions to the male day-school: there are 125 pupils at present on its books. There have been 633 pupils admitted to the female evening school: there are 81 pupils at present on its books. There have been 448 admitted to the female day-school; and there are 98 at present on its books.

"'The attendance may appear small, considering the great number of persons employed in and about the concern (nearly 2,000); but it must be borne in mind, that a large proportion of them live at a distance in the country, and there is, besides, another large school in the village adjoining.'"

Necessity of elementary education.

If we have sometimes diverged from the strict line of our Report, into the vexed question of elementary education, it is because we feel its direct bearing on the question of the practicability of giving improved industrial instruction of a higher kind than can be had at present. Now, even in this sense only, the importance of elementary education cannot be overrated. To the want of this must, in a great degree, be attributed the failure of many mechanics' institutions and the incompleteness of all; facts which many of our correspondents have placed in a clear light. This question seems hardly to require discussion. To be in a condition to enter upon a course of instruction in the principles of science and practical art, implies a certain amount of preliminary acquirement already made by the pupils on their entrance. Reading, writing, arithmetic including fractions, some history, a little poetry, a familiar acquaintance with geography, not to speak of a knowledge of higher things, all thoroughly learned so far as they have been taught. Now here, at the very outset of their course, so to speak, we would ask from pupils an amount of acquirement which many boys never attain to at all. It would be idle, therefore, to discuss the question of an improved industrial instruction, unless we assume that provision is to be made for a

Liverpool Mechanics' Institution.

very wide and decided improvement in elementary education. We fall into a great mistake when we take for granted, that elementary instruction is in a very much more satisfactory state than it was eighty or a hundred years ago. With respect to the middle classes, the old grammar schools, in their teaching, came up much more nearly to a level with the state of knowledge at the time, and they were not then so utterly inadequate to meet the wants of a thinner and a more sluggish population. And as to the poor, Professor Moseley has noticed a very remarkable fact in connexion with the admission of pupils into the *Greenwich Royal Hospital Schools*,— Low state of elementary education.

"According to the regulations," he says, "no boy can be admitted to the upper school unless he can read fluently, write small text well, and perform in arithmetic the rules of addition, subtraction, and multiplication with facility and accuracy. But so low is the state of elementary education in the country, that it is found impossible to enforce this condition rigidly; and many boys are admitted not being able to read fluently, nor to work the first three rules of arithmetic with facility and accuracy. A fact which is the more remarkable, and the more worthy of observation, because the standard of admission appears to be very much the same as it was fifty years ago, when the school consisted only of the sons of common seamen. How shown.

"It is scarcely possible to escape the conclusion, from a fact like this, that a standard of instruction was considered to be attainable by the sons of seamen then, which is not reached now; for in the lower school, which is composed of such boys, it is only within the last two or three years that it has been found practicable to establish any educational qualification whatever."

And, again, at page 18, he says,—

"Considering that some means of education are now everywhere provided, it was in the year 1848 decided that all boys admitted to the lower school should be required to read the Gospels. And nothing can more clearly show the deplorable state in which education still remains than that it is found difficult to enforce even this condition."

There are other facts which support this view. The parish registries throughout England, we are informed, do not show that the lower elements of a common education were at that time much less general than they are at present. Unless, therefore, we can succeed in proving to parents that an industrial education will have a direct bearing on the future welfare of their children, we shall make but little way in persuading them to accept it.

It must not be forgotten, that the exigencies of the times in which we live call for a change, as well in our method of instruction as in the elements of education. The wants which are daily springing up require a greater command over the powers of nature, as our knowledge of those powers is augmented. Professions and occupations which a few years ago were scarcely heard of, are now become recognized channels to wealth and station; while the learned professions, as they are called, languish, the supply being greater than the demand.

This is found to be the case not only in an old country such as ours, but to a very great extent also in the United States of America. In a document to which we have already referred,* views similar to these are very clearly stated.

"It is manifest to the most casual observer, that the movement of civilization is precisely in the line of the useful arts. Steam, machinery, and commerce have built up a class of society which formerly was only of secondary importance. The inducements to enter the learned professions have become far less, and those to enter upon the active professions vastly greater. The most coveted positions in society, seats in our highest legislative chambers, and even foreign embassies, await the successful merchant or manufacturer no less than him who has devoted his life to what is called a learned profession. And yet more; the number of those who consider a collegiate education indispensable to a profession, has for some time been rapidly decreasing. Men have come to doubt, whether the course which we pursue is that best adapted to prepare men for the duties even of professional life."

It is our duty to endeavour to supply that knowledge in the safest and simplest form, which men *will* have, and which they will no longer do without, in some shape or other. It would be idle to expect that private exertions, desultory and partial as they must be, could accomplish much to supply wants so varied and indefinite. Some central body must undertake the task. It is not for us to say how far our society might secure and retain the confidence of the public. But however this may be, some central organization will unquestionably be necessary. A centre of union, not a centre of control. If the Universities of Oxford and Cambridge were to be suppressed to-morrow, classical literature and abstract science, though still cultivated by a few, would gradually disappear as constituent elements of a liberal education. Were the administration of justice to be supported only by the voluntary contributions of those who required its assistance or sought its protection, we much fear that crime and outrage would soon be on the increase.

L. Milton. Lord Molesworth. Sir W. Petty. W. Fairbairn. J. Hick.

To found schools for art, and colleges for science, is by no means a novel idea. It has been floating in the minds of speculative and ingenious men for more than two centuries. Some of our most practical manufacturers have come to the same result, that some central institution is required which should organize, assist, and advise local institutions throughout the country. We believe the following outline would, to a great extent, include their several plans.

Summary of views submitted to Committee.

That a central institution be established in London or Manchester, or in some other convenient locality. That, on the plan of the London University, it should admit into union with it, colleges, mechanics' institutions, schools, and even private

* Report to the Corporation of Brown University, on Changes in the System of Collegiate Education, read March 28, 1850, p. 21.

seminaries; that the conditions of affiliation should be few and simple; that, like the London University, it should hold examinations, not, however, in London only, but throughout the provinces also. Unlike the London University, it should not only examine, but teach. It should be its especial duty to train masters as teachers of science, so far as it bears on industrial instruction, and not teachers only, but those also who intend to follow other occupations. They believe it better that there should be no separate school for teachers, but that all should be instructed together as in our older universities and their colleges, of which this has been represented to us as a truly admirable feature. We do not mean to imply by this, that teaching should not be taught as an art. Experience has established the principle, that to teach knowledge is an art, itself requiring to be taught. It has its own general principles, and specific rules founded on these principles. The central institution to have attached to it, exhibitions or scholarships to reward those students who, at the local examinations, should distinguish themselves, to enable them to receive a higher kind of instruction. The examinations in the provincial districts would enable the examiners to select the *élite* of our youth, who would thus be in a position to perfect those studies they had so worthily begun. This is a brief sketch of some of the suggestions we have received.

Appleby G. S.
Aynho G. S.
W. Charley.
W. Fairbairn.
A. Henfrey.
John Hick.
John Mercer.
John Phillips.
Rev. A. Rigg.
Ripon M. I.
Warrington M. I.
H. C. Watson.
Whitehaven M. I.
W. M. Williams.

A central institution of this kind would not only be well adapted to advise with and assist the present local institutions, but also to aid in the setting up of new ones. Even the mere establishment of the central institution would encourage the formation of others in the provinces, independent of it, yet looking up to it for advice and assistance.

Sir R. Kane, President of the Queen's College at Cork, thus writes to a member of this Committee,—

"When the Queen's Colleges were first opened in 1849, we found great difficulty about the preparation of our students for entrance. The existing classical schools were all so identified with Trinity College, Dublin, the entrance course of which constituted all they were used to teach, that in many cases they refused to let the books of our entrance course be read in the school; and almost universally they rather depreciated, and advised the boys against going to the Queen's Colleges.

"However, a great deal of that has passed away, and I have great hope that all will very soon be changed. Some of the old schoolmasters have died out, and their places are supplied by younger and more energetic men. . . . . The impetus of improvement in the classical (secondary) schools is therefore already and happily given, and it has descended from the colleges. It will therefore become influential in the education of a large class who do not proceed for a regular university education, but whose instruction will altogether consist in the course which the higher classes will read for college entrance. This I regard as one of the happiest results, as far as the general improvement in Ireland is concerned."

Science not the only fit element of industrial instruction.

It would seem almost needless to observe, did we not know how easily yet undesignedly the scope of an argument may be misapprehended, or the meaning of a passage misunderstood, that no greater mistake could be committed, than to build up an education on science alone, whether pure or practical. We believe that literature, including history and poetry, the cultivation of the fancy, and the free play of the imagination, to be at least equally essential, not to speak of that spiritual element which should lie within and beneath at the foundation of all.

CONCLUSION.

In concluding their Report the Committee will now sum up the chief points brought under their notice. They refer to the communications in Appendix A. for full details of the evidence by which they are severally supported.

I. A large amount of evidence has reached us, to the effect that the altered state of industrial competition imperatively demands an infusion both into elementary and secondary education of that knowledge of natural powers which is only to be obtained by a systematic study of scientific principles. The evidence on this head is furnished not only by men who have devoted themselves to the investigations of science, such as Sir David Brewster, F.R.S., Mr. W. R. Grove, F.R.S., Mr. Leonard Horner, F.R.S., Professor Moseley, Professor Miller of Cambridge, F.R.S., R. G. Latham, F.R.S., Professor Johnston of Durham, F.R.S., Professor Phillips, F.R.S., Colonel Portlock, F.R.S., Mr. Arthur Henfrey, F.R.S., Sir Robert Kane, F.R.S.; but it also includes manufacturers of high attainments, and whose evidence is of especial value. Among them it may be sufficient to refer to Mr. Fairbairn, F.R.S., of Manchester, Mr. Walter Crum, F.R.S., of Glasgow, Mr. R. Fort, Mr. Herbert Minton of the Potteries, Mr. Osler of Birmingham, Mr. Robert Napier of Glasgow, Mr. James Nasmyth of Patricroft near Manchester, Mr. John Mercer of Oakenshaw, Mr. Hick of Bolton, Messrs. Nelson, Knowles, and Co. of Manchester, Mr. Felkin of Nottingham, &c. We would refer to the letters of these eminent authorities given in Appendix A.

II. With regard to the special means of infusing science into education, we have received numerous opinions with respect to the propriety of extending the present courses of instruction in endowed grammar schools. We have been gratified to find that certain schools, such as those of Cheltenham and Birmingham, have voluntarily introduced instruction in the principles of science into their course of education (the former school more especially,) and that others appear prepared to adopt that course, such as Shrewsbury, the Liverpool Collegiate Institution, the Liverpool Mechanics Institution, and some others. But we have in general ascertained, that however willing the masters may be to extend their educational resources to science, they do not always possess the knowledge to do so, and that the endowments of the schools, considered separately, are either too small to procure external aid for this purpose, or they are so restricted by the conditions of their respective foundations as to render this impossible without a special legislative enactment. On this subject we would especially refer

to the letters from Mr. Inman of Grantham, Mr. Iliff, the Rev. Herbert Hill, the Rev. Dr. Kennedy of Shrewsbury, &c.

III. With regard to the proprietary colleges and schools, we have found, that while the evidence shows there is too common a disposition to imitate the confined course of instruction of the old grammar schools, still that some of them have introduced science to a considerable extent; and we conceive that the increasing expression of public want in this direction will be a sufficient inducement for those schools to extend their educational resources so as to include a department of industrial instruction.

IV. With regard to mechanics institutions, &c. we have found, that most of those which were intended for systematic instruction have been converted into places for recreation and amusement. We apprehend that a considerable change in public feeling must take place before their managers can make them extensively useful for the advancement of industrial instruction. On the other hand, there are special instances, such as the mechanics institution in Glasgow, and the school of arts in Edinburgh, in which there are already schools of industrial instruction. In several other places, such as Manchester, Leeds, Liverpool, Huddersfield, and Sheffield, there is so earnest a desire to afford systematic instruction through those institutions, that some encouragement, advice, and perhaps a little aid would suffice to enable them to rise at once to the position of industrial schools.

V. We find in the evidence before us, a strong feeling that the schools of Science and Art which may arise in consequence of the wants now admitted to exist should have independent action and self-government, but that they should have the advantage of a central body for advice, correspondence, and co-operation. The evidence also leads to the conviction, that Government must contribute a certain amount of aid, not sufficient however to dispense with local exertion and sympathy, but enough to give that first impulse to the development of schools which will enable them to prove their utility and value to the districts in which they are established.

VI. The evidence is nearly unanimous in recommending that a central body be charged to encourage the preparation of maps, models, diagrams, and apparatus, by which the course of instruction in the provincial schools might be rendered more efficient. This is a task which our society might undertake, we believe, with much propriety. To encourage the enlarged production of maps and models, of diagrams, and of the other multiplied apparatus of instruction which our improved systems of teaching will from day to day more pressingly require, would be to encourage the cultivation of art, and the extension of

manufactures, objects which are immediately within the scope of our charter. The evidence we have received on this point is very voluminous.

VII. We have not found a general expression of opinion in favour of prizes or other rewards merely honorary. Many persons whose opinions are entitled to much weight, object to provisions of this nature. The evidence published will be found to bear on this point.

VIII. We have received a very large amount of decisive testimony in favour of some system of examination for provincial schools in connexion with a central body, which should be empowered to grant certificates of proficiency. On this subject the evidence is unanimous and decisive. Several of our correspondents, whose opinions are entitled to the gravest consideration, attach the utmost importance to a practical provision of this nature. Some would go so far as to say, that without some conservative provision of this kind, no organization, however perfect it may be at first, can long be secured from inefficiency and decay. Amongst others, we would direct attention to the important testimony of Baron Liebig given at page 46 of this Report. The evidence of Dr. Murray of the Edinburgh School of Arts, may also be consulted with advantage, p. 55.

We observe in the opinions furnished to us by manufacturers, that while they strongly advocate the necessity of teaching the principles of science in connexion with the arts, they likewise urge the expediency of so arranging the courses of study that the pupil may understand he does not leave the school fitted to exercise an industrial occupation, but only that he has laid a basis upon which may be raised with advantage his further industrial instruction in the workshop or the factory. They entirely agree with the Committee in the expression of the conviction, that the practice of an art, or the manipulations of a trade, are best learned as realities, as the stated occupations of everyday life; while they are equally convinced that a knowledge of the principles of the sciences on which arts or trades are founded is an indispensable element in the instruction of the well-skilled workman.

In presenting this our Report to the Council of the Society of Arts, we would observe, that, since the duty of collecting evidence, and reporting thereon, has been entrusted to us, the Government has established a Department of Science and Art in connexion with the Board of Trade, and that the object of the Department, as we have been informed, is to establish schools for technical instruction throughout the Kingdom.

Much of the duty of the central body, to which reference has so frequently been made in our Report, usually implying the Society of Arts, will now be assumed by the Government Department; and we would therefore suggest to the Council, that the results of this inquiry, undertaken before the intentions of Her Majesty's Government on this subject were made known, should be published, and formally submitted to the Board of Trade, for their Lordships' information; with the assurance that the Society of Arts takes a deep interest in the objects contemplated by the new Department, and that it tenders its co-operation in any manner best calculated to promote the success of industrial instruction, so far as the nature and principles of the Society will allow.

We are, &c.

JAMES BOOTH,
Chairman and Reporter.
JOHN BELL.
PETER LE NEVE FOSTER.
THOMAS TWINING, Jun.

Edward Solly, *Secretary.*

APPENDICES.

APPENDIX A.

CORRESPONDENCE.

*** *The communications received by the Committee are arranged in Alphabetical order. Those from endowed Grammar Schools, and from Mechanics Institutes will be found in the order of the names of the respective localities whence they have been received.*

A.

[3539.]

From Mr. A. Aitkin, Chief Designer, &c., to Messrs Binfield, of Birmingham.

"It is with much pleasure I have to acknowledge your Circular of February 5th, directing my attention to the necessity which exists for providing for the industrial classes of the community a preliminary technical education. My own conviction for a number of years has been that this is a most important desideratum. I have, therefore, much satisfaction in recording my opinion in favour of the movement. At the same time permit me to add that my conviction has been strengthened by fourteen years' experience and intercourse with the class it is more particularly intended should be benefited by the introduction of a course of technical education.

"In the period alluded to, I have had the most favourable opportunities for observing the natural ability, ingenuity, and physical endurance of English mechanics. The result of my observations has been to produce the conviction in my mind, that even great natural qualifications, guided only by experience, will urge but an unequal contest against (other circumstances being equal) workmen trained to labour with a knowledge of science, and that therefore the most judicious course to be pursued by us is to supplement on the natural capabilities of English workmen an education having a direct reference to the several branches of manufacture in which they are engaged. Without this precaution, it is not unreasonable to expect our superiority as producers of the useful and substantial may be challenged, and the extended boundaries wherein the products of our manufactures find a ready market may suffer some diminution in consequence.

"The Second Report of the Royal Commissioners, the various lectures delivered before the Society of Arts on the results of the Exhibition of 1851, and the evidence collected by Dr. Playfair as to the Industrial Instruction movement on the Continent, are each and all

conclusively demonstrative and significant as to the efforts now being made by the various Continental States with the intention of training up manufacturers and artizans in order the better to contest with us in our position as manufacturers of what is most desired in the several marts of commerce, viz. useful and substantial articles at a low rate of cost.

"It has hitherto been, and, I trust, will continue to be, alike the glory and boast of England, that the raw material which may have been quarried, cultivated, or produced at the antipodes, and imported, has, notwithstanding the cost attendant upon sea voyage, been smelted, converted, manufactured, spun, or wove, and returned whence it came but little increased in cost, certainly not in proportion to the useful purpose it serves in its new form and application. The ease with which this has been effected by us has excited the desire for competition; and it cannot be denied that, once started in the race, the manufacturers and artizans of other countries are much more favourably situated than we; for already with them an industrial system of education exists; their museums contain collections of the raw materials, the manufactured objects, and the machines by which the several objects were produced, or which materially assisted in their production. In collecting these together, the various Governments or States have spared neither cost nor trouble. The consequence is, that the difficulties laboured under in the entire construction of a machine or the discovery of a process are removed, and the defects in either may at once be detected or remedied. Further, attractive displays of objects, machines, or processes are alike suggestive, attractive, and instructive. They are admirably calculated to arouse the inventive and constructive faculties, already quickened by an industrial education to detect the rationale of construction, &c., —these several adjuncts taken collectively render those in possession thereof dangerous opponents, when arrayed against practice only, unaided by scientific skill, without which it may be said that sure and certain results are not to be calculated upon. In truth the time has now arrived to which every exhibition of manufacturing art has been tending, viz. to show where intelligence and science has been brought to bear or called in to aid. That the manufacturer who has done so the most liberally has been correspondingly the most successful, or if personally the expenditure has not in his own case produced a commensurate return, yet eventually the craft, trade, or manufacture has been largely benefited thereby. The crude and empirical must henceforth have no place in manufactures; they must be cultivated systematically; to aid them, the whole arcana of science must be laid open; the intellect cultivated of those who are to be engaged therein. As a legitimate benefit or consequence which would flow therefrom, human labour would be lightened, certain results would be arrived at, cost would be diminished, and comfort would be diffused to a much greater extent than it now is.

"It may appear somewhat unnecessary, that now any doubts should be expressed as to the value of science as applied to industrial pursuits; and it matters but little whether these exist or are manifested by actual denial of the truth, or the refusal to adopt the principles which science has laid down for our guidance. The far-

seeing and enlightened few have maintained the excellence and superiority of the laws which regulate and control matter; but the adoption and recognition of such intelligent views have been slow, and have been determined by the spread of intelligence. The importance of scientific knowledge over mere manufacturing experience has been repeatedly demonstrated. Thus, in 1782, we find an intelligent D.D. lamenting (in a paper read before the Royal Philosophic Society of Manchester) that so few of our 'dyers are chemists, and our chemists dyers;' and in alluding to the elements of 'taste' and 'finish,' we find him saying, 'Our manufacturers must now have, not merely that strength of fabric and that durability of texture in which once consisted their highest praise; they must have elegance of design, novelty of pattern, and beauty of finishing.' To supply the wants already indicated, a public repository for chemical and mechanic knowledge is recommended. A *museum* is a prominent feature, to consist of 'all such *machines* in the various arts which seem to bear the most distant relation to our own manufactures; all the processes in those of *silk*, *wool*, *linen*, or *cotton*, should there be delineated. There should also be provided an assortment of the *ingredients* used in *dyeing* and *printing*, and for the purpose of *experiments*. A *superintendent* would be necessary to arrange and apply this collection to its proper use. He should be a man well versed in *chemical* and *mechanical knowledge*. He should deliver *lectures*, and give *advice* and *assistance* to those who wish to obtain a better knowledge of the arts.' An intelligent writer on the chemical principles of the metallic arts, in 1790, thus forcibly paints the difficulties which the mere mechanic labours under: — 'The smelting of ores, the manufacturing of metals, the elegance and durability of dyeing, the making of glass, porcelain, &c., all derive their beauty and utility from the same source. Most of these processes are conducted by artists who are entirely ignorant of their principles, but have acquired a considerable degree of certainty and ingenuity from practice; but should any unexpected circumstance arise which they have not experienced before, they are involved in a difficulty which all their practice cannot extricate them from, and which, in all probability, can only be surmounted by a proper reference to and application of the principles of the art; so that many losses must unavoidably be incurred in working from the want of such fundamental knowledge.' So much, then, for the recognition in time past of a want of industrial training, to supply which to a certain class the Museum of Economic and Practical Geology is well fitted; but, from its limited extent, it cannot possibly do a single tithe of what in comparison is required, nay, demanded. Its professors, however, in their inaugural and introductory lectures to the session of 1851–2, supply some very excellent evidence in favour of scientific education. Valuable ores have, in ignorance of their true value, served to macadamize highways. A most valuable mine, in the hands of an ignorant proprietor and superintendent, produced only pecuniary loss; while another, in the possession of an educated and skilful miner, though comparatively poor in metal, produced a fair return for the capital embarked.

"The advantages to be derived from the manufacturers, superintendents, and mechanics of our great centres of industry having

placed for their acceptance the means of acquiring a knowledge of those sciences which enter more particularly into the manufactures of the particular locality, cannot be suitably estimated or appreciated in our present state of transition between a determination to adopt science on the one hand, and to cling to practice only with the other. Let us take Birmingham for example. Can any thinking individual, who has troubled himself with the consideration of how little *is*, but how much *should* be, known by those who are engaged in the various manufactories, doubt as to advantages which would accrue to the manufacturer who thoroughly understood, or who had superintendents who equally understood, the rationale of the several processes gone into. Of the true philosophy of the sciences of metallurgy and chemistry how little is known of either by those who should understand both. Even the ability to produce an analysis of a metal is what is at present possessed by but few. And this is of the utmost importance to the manufacturer, and would go far to resolve many of the difficulties which from time to time present themselves alike to the annoyance of employer and employed. At such a period as the present, when the advance in prices of metals has directed the attention of the speculative to them. When new ores of copper from hitherto unknown localities may be expected to be brought into the market, the advantages of analysis in arriving at a knowledge of their true value in a money point of view, and also what such would be best fitted for, will be readily appreciated. It was with no small amount of satisfaction the writer of this heard, a few days ago, a leading ironmaster in Staffordshire declare the obligations which he considered were due to scientific analysis. As an instance he would cite the following: "in the purchasing of iron ores he did not, as formerly (cheap now as the conveyance by railway is), send for a waggon load of ore: he got a sample, sent it up to the Museum of Economic Geology, and he relied upon the opinion returned as to the per centage of metal, and regulate his purchasing of the ore and the price to be paid for it accordingly." Much as electro-metallurgy has been advanced, it doubtless would have been much more so had chemistry formed a part of the education of those who do the manipulative part of the process. To metal rollers, how important to know the effect of temperature upon the various mixtures; while to brassfounders and others how varied in shade or colour might they not secure the surface of the works executed by them, did they but know a little of the effect of the acids on copper and its alloys. In the matter of imparting colour to metals the French are yet much our superiors; and the most exquisite colours have been and are produced by Frenchmen, or from French recipes. From a want of a knowledge of the effect of change in temperature upon the action of acids, how much time and money is not unfrequently lost by the manufacturer. The several deficiencies alluded to will afford some idea as to what is to be gained by a small infusion of technical education. A 'little knowledge' to aid us in this particular will, it is to be hoped, not prove a 'dangerous thing.'

"The value of scientific knowledge being admitted, and its want demonstrated, it is to be hoped that the same measure of liberality will be exercised to aid in its diffusion as has already been done in the matter of design as applied to manufactures. Hitherto, as a rule,

science has been studied with us by philosophers only, and manufacturers have been in general dependent on experience gained by practice. The value of science being admitted on the one hand and experience upon the other, it is in their union that the true value of both is shown to be. United, they stand secure, affording a mutual assistance to each other. The battery of Daniell developed the art of electro-metallurgy, but the practical knowledge of Spencer pointed out a purpose to which the same could be applied. This recognised, science again came to the assistance of the newly discovered art, and the genius of a Faraday, a Daniel, a Smee, Shaw, Wright, and Napier, lent their valuable and efficient aid to its more complete and perfect development. The production of a cheap alkali by the French chemist Le Blanc, from the ordinary sea salt, is another forcible illustration of a want indicated by practice and supplied by science, and well-calculated to display the rich stores which lie waiting to reward the scientific inquirer.

"Acknowledging the important end which is being served in the institution of schools of design, the writer is of opinion that an equally important end would be served in the institution of schools for the purpose of imparting technical education to those engaged in manufactures, whether as principals or subordinates. The union of two such important elements as science and art, recognised by the state, and receiving assistance through a central institution, could not fail to operate beneficially, by enabling manufacturers to secure intelligent workmen, whose knowledge might be turned to account in economising time and material, and in devising means to accomplishing an end, which would tell with equal effect on the comforts of the many, the profits of the manufacturer, and the national prosperity.

"It is therefore satisfactory to find that views so much in accordance with the wants of the day are recognised by the Royal Commission under the presidency of His Royal Highness Prince Albert, to whom we owe the exhibition of 1851, and all the advantages which have resulted to trade and commerce therefrom, with the still more important prospective benefits to the national industry which is so clearly implied by Report No. 2. issued by the Royal Commission.

"A considerable amount of difference of opinion in all probability still exists, much prejudice, and, it may be, no little amount of ignorance as to the desirability of the said technical education. It will, however, be found, that such has its origin in a mistaken view of the intentions of those who are the advocates of the measure. The same objections have from time to time been urged against schools of design; but not a doubt exists that, at the present time, these objections are being removed, as the advantages of such schools are becoming more apparent. In like manner industrial education will speedily make its own value apparent. This, however, must indicate to us the importance of such a system being recognised by the government, until such time as the benefits derived therefrom present themselves in a tangible form. Then, indeed, it may be left to take care of itself. But, until then, it will be the duty of our rulers to assist, encourage, and foster the more intimate connection of science, art, and manufactures, and to afford facilities for the diffusion of a knowledge of the first prin-

ciples which are likely to operate in simplifying, economising, or increasing production. In referring to your circular, the illustration which is given therein as to what is intended to be understood by industrial instruction, appears to be very clearly set forth. Clever manipulation is the result of practice, which can only be acquired in the workshop. A knowledge, however, of the principles upon which the various looms, machines, turning lathes, drilling, brewing, and punching machines act, with processes exhibited which are in common and every day use in manufactories, could not fail to render the future manufacturer, artizan, or superintendent, all the better fitted to fulfil the duties required of them in their several situations. An intelligent estimate could thus be formed by them of the fitness of certain means to effect results; failures would be less common, and bubble projects in manufactures less likely to be entertained in consequence. 'A little knowledge,' in this particular, is not "a dangerous thing.' The more general cultivation of free hand, and mechanical drawing in connection with a knowledge of the various simple mechanic powers, and their familiar applications, would be very important. Some idea given also as to the properties possessed by the various metals, &c. &c., would be invaluable, and would point out to the student or pupil their fitness or the reverse for certain purposes.

"The improvement of the endowed grammar schools, and their enlargement so as to include, among the subjects taught, the elements of industrial instruction, seems to be a legitimate and proper extension of a system conceived in wisdom and executed in benevolence; but, at a period when scholastic learning was of much more importance than it is now, and when art and manufactures may be scarcely said to have had existence among us, and certainly not in ministering to the comforts of the masses, it is an unquestionable fact that, though up to the present time the revenues arising from property belonging to endowed grammar schools have much increased in value, the kind of education supplied by them has not kept pace with the requirements of the day. Thinking men have long since perceived, that mere classical learning, however much fitted to make the complete scholar, is certainly not that which would assist any individual to become a more skilful and intelligent manufacturer. Of what importance is it to one who is in after-life to be engaged in the prosecution of a trade involving the successful manufacture of metals, or of the animal or vegetable fibres in the weaving of cloth or calico, that he should, after years spent in the study of the dead languages, be put in possession, not of how the various processes performed in the craft he is to be engaged in are to be simplified or carried on, but that, as the reward of his perseverance, he should be introduced to the mysteries of heathen mythology, and learn that the heroes and demigods of ancient history were seducers, usurpers, and murderers, the characters of the philosophers by no means examples fit for imitation, while the productions of their poets consisted of epistles, odes, satires, and letters too obscene to be placed in the hands of youth; yet of such a kind is the information acquired at the majority of grammar schools. In one or two instances modern languages have been introduced, a commercial department has been founded, and, as an extreme stretch, drawing has been taught to the

scholars (but not within the precincts of the school), advantage having been taken of the school of design to transfer the students there. When it is considered that in such a town as Birmingham, a very large proportion of those who attend King Edward's Free Grammar School are sons of manufacturers who will in all probability become manufacturers in turn, the advantage of supplying them with information which will be useful in after-life instead of that which cannot be rendered available for practical purposes, will be readily understood, and offers a perfectly sufficient reason why industrial education should be introduced into the endowed grammar schools.

"The original intention of mechanics' institutes was to supply mechanics with instruction in the principles of mechanical philosophy, chemistry, and other sciences which bore either directly or indirectly on the callings in which they were engaged. Though such institutions have fallen short of the original intentions of their founders, there can be no valid reason why an attempt should not be made, or rather an attempt should be made, to convert them into what they were in the first instance intended to be, viz. industrial schools for artisans. Many such institutions have very excellent libraries; in some instances, collections of philosophical and chemical apparatus; others, such as those of Liverpool and Manchester, very excellent buildings, all of which appliances would seem to indicate that were a desire to support the proposed scheme of industrial education expressed by the members, their extension into permanently useful institutions might easily be secured.

"The establishment of a higher class of schools for those who are likely to have charge of manufacturing establishments is a question which admits of considerable difference of opinion; but for the purposes of supervision of a manufactory, a greater amount of knowledge is certainly needed than is necessary for a workman employed in executing a particular portion of the work. As this is, however, calculated to encourage class distinctions, it might be well to leave this particular of the scheme for further consideration, alike upon class and economical grounds.

"That aid should rather be given in the first instance than support, appears reasonable and calculated to render the local institutions more independent. It will be well, however, to consider, before any permanent decision is come to, whether exceptions should not be made in favour of certain localities where an important manufacture is carried on, while the manufacturers are few in number and the people possessed of limited means; but where it is at the same time important that they should be in possession of correct information as to the principles, whether mechanical, chemical, or both, which regulate their particular trades. In the grand centres of manufacture, such as Manchester, Birmingham, Leeds, Bradford, Glasgow, &c., it is to be hoped that money support would not be desired; while the reduction in the cost of books, maps, models, diagrams, and apparatus would be advantageous in economising the funds and increasing the resources of the institution by the purchase of additional illustrations for lecturing purposes and of books for extending their libraries.

"Without a systematic and defined course of study it would be alike absurd and impossible to carry out any course of industrial instruc-

tion. Uniformity of study, in all districts, is not advisable; that best fitted for the potters of Staffordshire is not that which would suit a Manchester weaver, cotton printer, or mechanist. Again, a specific course of instruction would be needed where the woollen manufactures of the country are cultivated to the greatest extent; while chemistry, metallurgy, &c., would more particularly make up the sum of the Birmingham artizan's studies. Thus, not on account that any kind of knowledge is valueless, but art is long and life is short, the necessities of life require on the part of the working man his attention to be directed to the particular branch of industry he is engaged in; the propriety, therefore, of subdivision and educating specially will, it is hoped, be understood.

"In a commercial and manufacturing country such as England, it is singular that in time past rewards have been conferred upon those who have been proficients in matters which do not either directly or indirectly operate upon the national industry. Successful students in endowed grammar schools obtain free exhibitions to the Universities. The talented young artist who is successful in the competition at the Royal Academy, is afforded assistance to increase his knowledge of his profession by visiting Italy, and in her galleries of sculpture and painting to study the excellences of the fathers in art. It is therefore to be desired, that in the new scheme of industrial education some system of rewards, in the form of prizes, exhibitions, or scholarships, shall be provided, which, while they will present themselves as incentives to the students, will be his passports to situations requiring a knowledge of science allied to industry. Medals or books might mark the lowest degree of excellence. A diploma, signed by the teacher or professor, recommending the student as being qualified to fill a particular situation, might distinguish the second; while the first or highest would be distinguished by gaining the privilege of attending a given number of sessions the industrial college in the metropolis, where, with superior and more widely extended opportunities of study and observation, the abilities displayed by him at the provisional institution might receive their complete development of usefulness.

"For the completion of the scheme of industrial education, the writer is of opinion that there is no element more useful than that of museums, the exhibition in visible shape to the eyes of the visitors, of the raw material; the machines required in the conversion of raw material into a useful object; the chemical agents also employed in the processes; the finished object, or the manufacture completed; with illustrations, in which the ornamental form has been called in to assist in infusing the element of beauty. In the furtherance of these views it will be evident that, in the first instance, museums of a very extensive character, or their contents of a very varied kind, is not to be expected to arise out of the subscriptions raised for the support of such institutions. The writer would therefore respectfully suggest on the present, as he has already done on a future, occasion, in a somewhat kindred subject, viz. that in their early stages, such museums should be confined (so far as the money purchases are concerned) to those specimens of raw material, machinery, and manufactured products or articles as will be likely to aid and suggest, for the more

perfect development of the manufactures of the peculiar locality wherein such museum is situated.

"The subject of technical industrial education is one of very great importance, and though, as I am willing to believe, we have gone on very well *without*, the question is, would we not be much better *with* it. When the conflict approaches, it is well to be arrayed and armed for the fray; and most assuredly the union of intelligence and scientific knowledge in connection with practice,—the ability to *do*, with a thorough understanding of the *why* and *because*,—is the best defence which we can be in possession of; the sure and only antidote, and the true preservative against the industrial competition against which it is not improbable we may be called to do battle."

[2472.]

From M. G. Arnoux, chief designer at Messrs. Minton's, Stoke-upon-Trent.

(TRANSLATION.)

"SIR,—It is not until to-day that I have had leisure to reply to your Circular of the 31st of January, in order to lay before you my opinion on some of the points on which you ask for information. I do this in French, because I can thus express my thoughts with greater exactness.

"I have already had occasion to submit to two eminent individuals, specially connected with the department of practical art, some observations upon the spread of artistic teaching among the labouring classes; and I shall pass by all that relates to that part of the subject, and confine myself specially to the means of diffusing scientific and industrial instruction among the people.

"If any rapid advance in the arts of design is for the present doubtful, at all events the same cannot be said of industrial instruction, to which the practical turn of mind and calculating character of the English appear to me to be peculiarly adapted; and whilst every one at the present day feels the necessity of it, we should rather seek to ascertain what may practically be done in the actual state of things, than try to upset what already exists.

"The subject divides itself into two completely distinct parts: 1st, the instructions to be given to workmen and artists (and this, again, may be divided into *general* and *technical*); 2nd, that to be given to young men who may hereafter become masters, such as manufacturers, engineers, &c.

"These two divisions must be kept distinct. The first should receive, in his own district, a free education of an essentially practical character; the second, on the contrary, should, at his own expense, proceed to seek, in London, instruction both theoretical and practical —the only place where professors fitted to supply instruction of that kind can be got together. I will take these two divisions of the subject separately.

"In proposing to improve the technical instruction of the workman,

I do not presume you to have had the idea of taking any of them away from the works of the factory to send them for instruction into a special school of art and trade. All observation shows that nothing is better for the workman than apprenticeship in the workshop under the paternal guidance of the master. He is there naturally led to perfect his processes, whilst he profits by the improvements of his companions. It will be sufficient, then, to aid his intelligence by giving him a knowledge of the resources which science places at his disposal. There are in France two special schools of art and trade for artisans—one at Chalons, and the other at Aix. These schools, up to the present time, have produced but doubtful results, for two reasons. The first is, that the professors of the different branches of trade relax in their energies, and after a certain time no longer keep pace with the improvements of the day. The second is, that the pupils thus kept two or three years away from the workshop lose their handicraft skill; and, simply, because they have been brought up in a special school, they acquire a self-sufficiency and conceit which renders them extremely loth to return to their former position. A step in this direction only produces malcontents, and tends to swell the ranks of future chartists and socialists. On no account should a young man be taken from his workshop. If his mind be of a superior order, you may rely upon human nature for his becoming, whether artist or workman, a Rembrandt or a Jacquard, if, after his hours of labour, you can offer him in the evening the attraction of an institution where he can cultivate his mind and his taste. By providing such establishments as the *Conservatoire des Arts et Métiers* in Paris, you will attain your end.

"But you may say, 'We have a great number of mechanics' institutions open for workmen, where they may instruct and improve themselves.' Allow me to say, that as they are at present constituted, they can scarcely do any good. Keep them as *moral assemblies*, useful for preventing young men from making a worse use of their time; but do not imagine that meetings where the subscribers are at all times left to themselves, without teachers to point out the good from the bad, where lectures are few, given in a desultory manner, sometimes on one subject and sometimes on another, by fourth-rate lecturers, can ever be of real benefit to the country.

"I know that institutions such as I should like to see formed are not possible in all districts; and I do not imagine it possible to establish more than five or six of them in all the great towns in England, for the simple reason, that you have not in reserve a sufficient number of professors fitted for giving such instruction; but you can judge of this matter better than I. I would also add, that on the choice of professors will depend the *life or death* of your establishments,—if they are not chosen with great impartiality, and if you do not, by liberal salaries, induce men of real merit to enter on a career of teaching. Every thing will depend on this. I am convinced that the great impediment to the development of the schools of design, on the system which you call 'self-supporting,' has been the incapacity of the masters; not that I think them bad painters or bad designers, but because, for the most part, they are ignorant of good methods of instruction. Be assured that, with this

object in view, it is not easy to find a professor who can explain *clearly* to young workmen such things as descriptive geometry, the laws of physics, or the elements of statics or dynamics, without using complicated algebraical formulæ, which they would not comprehend. When you find good professors, build for them a *bridge of gold;* for it is they who will form others to take charge of schools hereafter to be established in the provinces.

"Another principle in teaching should be the division of the courses, in order that each master may undertake to teach only that which he knows really well. For such courses as those on metal-casting, machine-making, glass-making, pottery, paper-staining, dyeing, &c. &c., it will be necessary to have recourse to instructed practical men who will undertake, in a fixed number of lectures, to treat of that art with which they are specially conversant.

"It is, then, only in London that you can hope in a short time to establish a college of arts and manufactures as complete as it ought to be. It is there you must make your first experiments; and it is only after a time that you will be able to supply the provinces with similar institutions on the smallest scale. The experiment may be made in London with little difficulty. The necessity is urgent; and there would be no need to wait for a building, because the courses might be given provisionally in existing lecture-rooms, so as to judge of the modes of teaching by the professors who offer themselves.

"Government must, without doubt, assist in the supplying these colleges with libraries and collections, which must be placed under the charge of the masters. If you reckon on private generosity for providing these colleges with necessary articles, you will fail. Such generosity is always limited; but even if not limited, it is rarely exercised with sufficient discernment in the choice of objects. I am convinced that few persons know what is really necessary to place before the eyes of the pupils of any district, whether for schools of design or the future industrial schools. There can be no guarantee on this point, except in a committee chosen from enlightened persons, with sound judgment, who understand what the pupils ought to learn both by inspecting collections as well as by listening to the lectures of a professor.

"I have not quite made up my mind on the question of giving prizes. Excellent, no doubt, for stimulating artists, are they necessary in industrial classes? Pupils of these classes will not have time to put in practice any manual labour in the College. Perhaps it would be better to establish no regulation on this head, and to leave the youths, and even the men, to profit freely by the instruction which you supply. Do you not put a man of forty years old to the blush, if a youth of fifteen, with a more expanded mind, carries off the prize from him?

"As I cannot here enter upon any programme of courses, I conclude my general observations by recommending that industrial teaching should begin sufficiently low, because the greater part of workmen or artists who will attend the courses in the colleges have scarcely had time to learn to read and write before entering the workshop, and will not be able in reality to take advantage of the benefits which you will introduce into elementary and other schools.

"I shall be very short in my remarks on what ought to be done in the way of industrial education for the higher class. According to my notion, it is only necessary to establish in London a central school like that which we have in Paris, assigned for training what we call 'civil engineers.' This school, altogether private, is due to an intelligent individual, who has got together the best professors, and who has made them interested in its success. This establishment, which is very profitable to its founder, has indeed been a real blessing to France, for whom, in a period of twenty-four years, it has turned out 1500 skilled subjects, who at the present time are to be found at the head of our most important manufactories, and who have contributed, in no small degree, of late years, to the progress of French industry.

"Such an institution, if founded, could only be for young men already prepared in other establishments. It is therefore necessary that, in these latter, instruction in science should be sufficiently attended to, in order that the pupil, on coming to the higher school, should at least know perfectly the first part of algebra, linear drawing, and descriptive geometry, and geometry properly so called. As I have little knowledge of what is taught in England in 'grammar schools' and others, I can say nothing on what should be done there.

"Such are my general remarks on what I think may be done at once. If I can furnish you with further remarks on the details, I will do my best to give you a reply; and I have the honour to be, Sir, &c."

[2173.]

The Secretary of the Mechanics' Institution, Aberdeen, writes as follows, —

"Your circular of the 22nd ult. I have laid before the Committee of this Institution.

"They view the subject as one of great importance and requiring careful consideration. They agree in thinking that the best means of securing success in any scheme of industrial instruction, would be by giving encouragement to existing institutions to make that their principal object. The element of amusement has of late become too prominent a feature in many of them; but this, though it may produce a temporary effect in attracting members, is sure to be a failure ultimately, if haply it should lead to nothing worse.

"Industrial instruction, it is conceived, ought to be conducted on a uniform plan in every place where it is adopted. The want of this in institutions which had for their original object the education of the people, has no doubt tended greatly to their inefficiency and want of success. Had a systematic and uniform curriculum of instruction, calculated to be of practical utility, been generally established a quarter of a century ago, and means taken for continuing it, at least for a time, mechanics' institutions would have stood in a very different position from that they now occupy. Instead of failures being the peroration of almost every chapter of their history, these would have formed the exceptions, and from causes easily assignable when they did occur. Workmen of every class would have found ere now, from

experience, that the instructions of the people's college had become as indispensable as the training of the workshop.

"However desirable it might be, it does not seem possible that any really efficient scheme of industrial instruction can be self-supporting, at least for a number of years. The plan on which assistance is granted to schoolmasters by the Council on Education, or that now being carried into operation by the Department of Practical Art, might be successfully applied to people's colleges, under modifications suited to the difference of purpose. Were competent and certificated teachers appointed—a minimum salary secured to them by Government—and certificates granted to pupils who had passed creditably through the prescribed course of instruction—such institutions might ultimately become independent of extraneous aid, because workmen would feel their advantages, and the necessity for attending them.

"What the course of instruction should be, is a question requiring deliberate consideration. But it seems pretty evident, that one course would not be suitable for all. Some from profession or taste would prefer a mechanical, and consequently, to a great extent, a mathematical course: others, again, would require a course where the chemical sciences were more predominant: while another class would be more benefited by a course in which the artistic character prevailed. It is possible that all these ends might be attained, and appropriate certificates granted to the students, at the termination of the curriculum.

"At the end of the first and second sessions, certificates of attendance to be given; so that those who might have occasion to remove could be admitted to the advanced classes of another college.

"At the end of the curriculum, an examination to take place on the whole course of instruction; and certificates of proficiency, or diplomas, granted to those students found deserving. Entrance examinations would be necessary—such, for example, as the four first rules of arithmetic, on the parts of speech in grammar, &c.

"Every town desiring the establishment of a people's college should be charged with furnishing proper class-rooms, keeping the same clean, heating, lighting, and properly ventilating them. To meet these expenses, a fixed proportion of the students' fees to be allowed; the balance being paid to the teachers, to account of their salary.

"An annual report, statement of funds, and other statistical information to be furnished to Government; so that the progress of the colleges may be accurately known, and reported to Parliament.

"Students who have obtained certificates of proficiency to be life members of the several colleges, wherever they may reside, and entitled to the free use of the libraries attached to them; to maintain which, it would be desirable that some aid should also be extended by Government.

"Courses of lectures on various literary and scientific subjects are highly important; but our experience is, that they are only appreciated by the more intelligent classes of the community. The mass of the industrial classes do not value them, and will not pay for them; hence the limited audiences they generally draw forth. But, were the system of instruction proposed carried into operation, a few years would train

up a new class of attenders on such lectures. Then, and only then, may it be expected to see such miscellaneous lectures encouraged not as novelties, but as means of acquiring information.

"The Committee regret, but are not surprised, at the result of the returns for lecturers, as reported in your circular in No. 8. of your 'Journal.' A hint was thrown out, that the Society might fix upon a few lectures and lecturers on the subjects that have been most sought for, and offer them to the Institutions at a fixed rate per lecture."

[1821.]

The Rev. W. A. Strange, D. D., Head Master of Abingdon School, thus writes, —

"'Industrial Instruction,' however, is a wide term, and one of large meaning. Where or what would be the text-book of its scholars? Some definite scheme of instruction should therefore be proposed.

"I am decidedly of opinion that it would be better to introduce improved systems into existing Grammar Schools, than to erect new schools where those already exist: where there are no Grammar Schools, as probably in large towns of comparatively recent growth, then such might be erected as would suit your Committee's views.

"Prizes and exhibitions might, I think, well be instituted in certain schools, or among a certain number of them, for candidates best qualified for industrial pursuits; indeed, a friend of mine has often talked of endowing this school with an exhibition, tenable for four years, of 50*l.* per annum, for the boy who shall prove himself to competent judges best fitted for any profession or business he may choose to follow, over and above a proficiency in the ordinary branches of education.

"I cordially approve of the object and attempt of your Committee, and am," &c.

[2259.]

Mr. John Allen, of Liskeard, writes: —

"Liskeard, 2nd mo. 7th, 1853.

"Esteemed Friend, E. Solly, — I beg leave respectfully to acknowledge the Circular of the Committee of the Society of Arts on Industrial Education, and to say that I have conferred with the vicar of this place, and other friends of education here, respecting it. We highly approve of the objects which the Society has in view; and believe that education generally ought to be much more practical and scientific than it is at present; but we are not, of course, prepared to recommend through what means this may be best effected.

"In this town we have both Boys', Girls', and Infant Schools, supported by all denominations; an Adult Evening School three times in

the week, a Working Men's Reading Room, a Mechanics' Institute, a small Public Library, and a Young Men's Mutual Improvement Society. Most of these are well maintained and attended, and a good deal of practical knowledge is conveyed; yet a large proportion of the working classes are indifferent to the improvement and mental cultivation of themselves and their children, and are growing up in ignorance and vice, the adults attending no place of divine worship. The children are rescued from this evil by several 'Sunday Schools;' but even many of these wander about in dirt and neglect.

"If a stimulus can be given to industrial scientific education, though the machinery is not very obvious, we believe that a great benefit will be conferred on society at large; much of the instruction now given in the public and private schools of the country being now restricted in a large degree to what may be termed 'book learning.' This is felt by most teachers to be far less laborious to themselves, and more mechanical, than the practical cultivation of experimental knowledge; and, therefore, the latter is too much neglected.

"I am," &c.

[2946.]

From Mr. R. Atkinson, of Dublin, Poplin Manufacturer.

"31. College Green, Dublin.

"With respect to the general tenor of the Circular, I most heartily agree; and consider that, if the object can be carried out, it will be of paramount importance to the rising generation: but, as regards the first suggestion, viz. the introducing industrial instruction into our Grammar Schools, I think it would be advisable not to interfere much with them, unless in a very elementary manner, as a knowledge of English literature is necessary as a basis for a higher course of instruction; therefore, I would prefer having our Mechanics' Institutions made Systematic Instruction Schools for Artisans.

"With respect to the other suggestions, I think them most admirable; and, as a manufacturer of nearly *forty* years' standing, can bear testimony to the great advantage of having intelligent and skilled workmen — and, even if that were the only advantage, it would be great — but, now that other countries are applying their energies to further manufactures, and that every new application of an element is followed by its adaptation to manufactures, it is absolutely necessary that the youth of these countries should be educated in those industrial pursuits, so as not to be behind any other country, and also to be able to apprehend and apply the various discoveries made in science to manufacturing purposes.

"I am," &c.

B.

[2285.]

From Charles Babbage, M. A., F. R. S., &c.

"Sir,—I beg to acknowledge the receipt of your letter on the subject of the education of the people, and more especially on their industrial education.

"I have long been convinced that education, at least in England, is scarcely advanced beyond its infancy, as an art.

"The pupil usually looks forward to his task as a bore, and would gladly avoid the acquisition of much that is forced upon his attention. That the acquisition of knowledge should necessarily be accompanied with disgust, is directly at variance with the experience of all who have themselves enlarged its boundaries. Nothing is more exciting than the pursuit of those laws by which nature organises the world we inhabit; and, after endless disappointments, nothing gives more permanent pleasure than the knowledge of those laws, which industry and genius have thus enabled us to detect. It is the triumph of the *acquisition*, through the successful exertion of our own faculties, which gives zest to our enjoyment; and that enjoyment might, by proper modes of instruction, be raised in the breast of the youngest student, as certainly as in that of the most profound philosopher.

"For this purpose, however, it is necessary that the teacher should be a master of his subject, and have very accurate knowledge of the capacity and the state of information of his pupil. He must then be able to divide or break up the subject which he teaches into stages, of such a degree of simplicity, that the pupil shall by his own apparently unaided efforts be himself able to make the greater part of the proposed steps.

"That a large part of the student's acquisitions will be accompanied by much of that delight which ever attends original investigations.

"These observations relate to the cultivation of reason and invention. I need scarcely add, that each faculty must have been previously trained, in order to enable the pupil to make the most of his powers.

"The talents that might be developed, and that are required, in such instruction, are of the highest order, but the miserable payments that are made for teaching effectually prevent their application to such purposes.

"It is impossible for me, without far more time than I have at my disposal, to offer to the Committee any thing but short references to those parts of my own works in which I have endeavoured to plant the seeds of instruction, which, under abler culture, may, I hope, assist in advancing industrial education.

"In the 'Decline of Science in England,' 1830, there occurs a chapter on Observations. That part relating to the art of observing might with advantage be applied to many arts. If put into an

improved form, it might perhaps be used as a type for the exercises of students.

"In the 'Economy of Manufactures' there occur many illustrations of the art of observing in workshops. In fact, if that work were brought up to the improved knowledge of the present day, there are few branches of industry which might not be rendered more intelligible through its aid, both with regard to details of practice, as well as to its economical principles.

"In the 'Exhibition of 1851,' I have also examined some of the elementary causes of successful labour.

"In Holtzapfell's 'Mechanical Manipulations,' I have sketched the philosophy of a small, but important subject, that of tools for cutting metals.

"In the 'Philosophical Transactions, 1826,' I first published the mechanical notation. After an experience of more than twenty-five years, I am intimately convinced that it must ultimately become the received mode of expressing the actions of all complicated machinery, because no other mode exists of describing machines with equal conciseness and clearness. I believe the only reason why it has not yet been adopted in teaching mechanical drawing is, that I have not published any elementary work on the subject. I enclose for the Committee an abstract of the laws established in two of its chapters.

"Having no time to copy, and scarcely enough to correct, this rapid sketch, I can only regret its imperfections, and apologise to the Committee for its evidence of haste.

"I am,
"Your obedient Servant,
"C. Babbage.

"P. S.—I remember, some years since, to have had in my possession a collection of questions for examining students of the economy of manufactures, which was drawn up by an accomplished lady for the use of her pupils."

[2099.]

The Hon. and Rev. Samuel Best, Rector of Abbott's Ann, Hants, says, in his reply,—

"I am too sensible of the difficulties of the educator, which I have, I hope, notwithstanding, at least partially succeeded in overcoming, not to appreciate any well-directed effort to remove them. I know not whether I owe the circular to my known opinions on education, or whether I receive it officially. It might possibly make some little difference in the confidence with which I should venture my opinion on the propositions you make to me. Let this, however, be as it may, a practical acquaintance with the difficulties of the subject, with which I have had to struggle in a country village for more than twenty years, until I have at least attained to something like an approach to a self-supporting school, has furnished me with such opportunities of estimating the requirements, the theories, and the difficulties of school

keeping, that I am not withheld by a feeling of presumption in offering an opinion.

"I am most fully convinced that the real difficulty of the educator has been of his own making. Education has been hitherto, in too many cases, only a nickname for an useless and unsaleable commodity; and while every discussion on the subject has involved principles of separation and discordance, the real points of the matter have been kept out of sight. Accepting your definition of industrial instruction, as a knowledge of the principles of the sciences on which arts and trades are founded, it is very important that the knowledge of such principles should be made not merely an addition, but the basis of secular education; and in using this phrase, I must, most earnestly, guard myself against misconstruction. To omit moral and religious training would be to cultivate for the sake of the husk, and not the kernel; nor can I conceive any thing to be education that does not encourage freedom, while it gives a sound direction to thought. But religious and dogmatic teaching are totally distinct; and as the one is to my mind essential to the other, is one of the great obstacles that have hitherto defeated the cause of education. Let me, however, drop this, which I have only ventured on from fear of misconstruction, and address myself to the propositions of the society. On the second proposition, I should like to ask information. In a neighbouring town there was a Mechanics' Institute in which I took an interest. It died out, partly from want of funds, partly from indifference; and a "Young Man's Instruction Society" sprung up in its place. Although the institute failed, we preserved its library and property in the hands of trustees, of whom I am one, in the hope of a revival. Can you point to me in what way we could at a reasonable cost provide a supply of lectures if it were revived, or can you tell me from any knowledge of a similar case what steps we could take to turn our position to advantage (the town is Andover)? The fourth proposition is admirable, and would have a more wide-spread effect than the proposition appears to contemplate. In my own school all the books are purchased; and, as I well know, are the means of educating at home many whose mistaken pride will not allow them to seek education in the evening school. They are the means of giving a higher tone to the reading of the cottage. Propositions 6, 7, 8. would produce an admirable effect, but I should like to see it carried farther; and, as the machinery is in existence in the system of Government inspection, to grant certificates, say at the age of fifteen (or as may be determined), to all who, having been in school (say three years), should be able to pass the same examination as the pupil teacher, and that this certificate should be necessary for public employments or any offices of trust on railroads, &c. This would establish in our schools a pupil junior class, and keep many in them who now leave so early as to render the efforts of the educator nugatory. To this class I should like to open the Queen Scholarships; and, in the school, instead of the formal apprenticeship which often favours one to the exclusion of many, allow the master or managers under the inspector to employ and pay, in such proportions as they think fit, such of the class as are best suited for the particular subject taught—drawing by the best draughtsmen, geography by the best geographer, &c. Without this division of

subject, I do not think we shall attain the object of raising the standard of education generally in our schools. I can only speak by experience, but I have found nothing work so well and efficiently as a class for each subject. It is on a small scale, and in a very humble village school, that that experience is formed. I submit it, therefore, without a view to general application, of which I am not fully competent to form an opinion. Admiring and entering into the principles enunciated in the circular, I have been led into this lengthy disquisition, which I hope you will pardon: and, with every wish for success in the laudable labours of the Society, subscribe myself," &c.

[2465.]

Letter from M. Bontemps, of Birmingham.

(TRANSLATION.)

"As I have been thought worthy to receive a circular from the Society of Arts, I consider it my duty to lay before you my ideas on the object the Society has in view, and I take the liberty of addressing you in French, believing that I shall thus make myself better understood than by writing in imperfect English.

"The object of the Society of Arts is one of the grandest that can be proposed,—namely, that of enlarging the measure of knowledge, principally among the industrial classes; and, therefore, men most eminent in art, in science, and in industry, should be called upon to assist. Its business is to initiate young men in those branches of knowledge which an ordinary mind may grasp, and which fall within rank of application to their future business. It is indeed a work of difficulty. I consider that such minds as Herschel, Faraday, Brewster, De la Beche, and Wheatstone, would in no respect be degraded by co-operating in such a field. From such men the Society of Arts should seek books for these schools. Such men would render science plain and attractive. All the natural phænomena, the great physical and chemical laws, will become familiar to youths who will hereafter apply them. Let the Society of Arts, above all, take care to procure men of talent to write treatises on the applied sciences. There are a number of such treatises in France, many written by men of high reputation; but, I must say, they have generally failed, leading their readers astray by describing processes incomplete and often inaccurate, or which have long since ceased to be used.

"The Society of Arts should, in my opinion, even apply to eminent manufacturers for treatises on that branch of trade in which they are or may have been engaged. The more eminent the manufacturer the less will he fear publishing his secrets and his processes. In this age success does not depend upon secrets. Every manufacturer knows well what his rivals are doing. The real secret of business lies in enlightened management. I feel persuaded that the most worthy manufacturers will make no objection to writing treatises on their business, making known its history, its processes, its actual state, and, above all, the improvements of which it is capable. To this point we must turn the attention of the young mind: it is there we shall find the elements of success and fortune of the future.

"But it is not sufficient to make the education of our youth scientific and industrial: we must form its taste, and develope its artistic powers. It is here the great difficulty of the problem lies. There is no want, in England, of learned men, of the highest order; of manufacturers, of the greatest skill; of workmen, who second the efforts of the latter to solve the problem of that cheapness which renders the whole world dependent on its industry. But how shall we give an artistic impulse to their products? Where are the masters to give such instruction? Are they to be found among the architects, the painters, or the sculptors? What do the first produce? Buildings, it is true, which are not without some merit; but they are simply copies —recollections of the monuments of past ages. The painters produce pictures, whose high price sometimes is significant of their real value; but they care not to apply their art to manufactures. Sculptors seek inspiration from the antique—striving to realise the beauty of the human form; but never trouble themselves to design the outline for a vase, or any other article of domestic use. Where, then, are the teachers of youth to be sought? The French, more advanced in some points in this respect, have still great need to impress a more artistic movement on their education. I should say that teachers in the present day can only be found in the examples of former days, and of countries which, though inferior in many respects, are infinitely superior to us in an Art point of view. In short, we must take Art wherever we can find it. We must establish museums and models for the use of schools. There must be collected the beauties of Grecian art, the treasures of mediæval Art, and particularly of the 13th century; which, in its religious works, affords us such sublime examples, in point of conception, form, and colour. Nor must we forget the imaginative marvels of the Renaissance. But, in addition, and I particularly urge it, because it is less generally felt, let us not fail to collect the precious productions of the East, which are at the present time so superior to ours, particularly in the point of combination of colours. Let us study and improve those rich designs for carpets and shawls which we strive servilely to copy, and whose invention continually supplies us with new patterns. Let our young men try to turn to account those points in which the manufacturers of China so far surpass the imperial, royal, and other manufactures of Europe.

"To conclude, I will add that music ought to find a place in the education of youth. Make them sensible to its influence. Young minds, further developed by this additional instruction, will soon easily become familiar with the best works of all ages and of all nations, and will proceed, not merely to produce copies, but give birth to novel productions, and thus place on the 19th century the seal of Art, which at present is wanting.

"In thus giving my ideas, Sir, I beg you will excuse my having so far diverged from the list of your questions. But I thought they would be treated of by men more eminent and more competent, and that I had better confine myself to the one point of instruction in schools. I trust that the great desire on my part that the Society should succeed in the noble object it has in view will be my excuse. I have the honour to be," &c.

[2862.]

From Dr. George J. Bompas, of Fishponds near Bath, —

"The reference to Mechanics' Institutes suggests the remark, that there is a difference, between schools for boys and schools for men, which ought never to be overlooked, and which requires a different plan. The latter is, generally speaking, supplementary to the former, and its object is distinct. The main object of the education for men must be to prepare them to follow, or to aid them in following, some special avocation, by furnishing instruction, of a more advanced and practical kind, in such branches of knowledge as they require; and every facility ought, I think, to be afforded to each student for selecting such courses as will most assist him in his particular calling, or be most in accordance with his taste and abilities.

"The object in schools for boys, on the other hand, is not so entirely the communication of actual knowledge, — not even principally, I think. It is, or ought to be, quite as much to cultivate and train the mental faculties of the scholars, so as to prepare them, as far as possible, for the right use of knowledge, and future acquisitions in it. It seems to me that this end of school education must be the same for all, both high and low, and ought to be borne in mind, and acted upon as far as practicable, in determining the plans and course of instruction in all schools; and that this object is best attained, with many other advantages, when there is in each school a regular and uniform course of subjects for instruction, to which all the scholars shall conform.

"The qualifications particularly desirable for various occupations, in which one and another may hereafter engage, have been considered, so far as my information could guide me, and especially those qualifications of mind and character which are of common importance, whatever may be the pupil's future destination.

"Every scholar, too, must be regarded as having various relations in life, apart from his business, to sustain, domestic, social, and public; and his education ought to be such as to adapt him, whatever be his station, for the fittest discharge of his duties as a member of society, as well as for the successful prosecution of his business or profession. In order to accomplish this, it seems evident that the means are to be found in the cultivation of our pupils' minds expressly and systematically, and in the adaptation of the subjects and modes of instruction to that end, rather than by enlarging any way the mere amount of their acquirements; for mere stores of learning, more or less, apart from the way in which they were gained, and the intellectual discipline of which they have been the occasion, will never make the kind of man we want. And I think that this sort of treatment is as needful for the children of the poorer classes, as for those of higher station. The teacher for every class of society ought to consider it a regular and most important part of his business, to develope the reasoning, observant, and inventive faculties, and so forth, of his pupils, their good taste, as well as their moral and religious feelings, and to make it his study how he can best do this, with the means at his command. He ought at the same time to convey as much know-

ledge as he can, consistently with his other aim (that is, without cramming, or any superficial and make-believe methods), and on such subjects by preference as are at once of most practical utility, and best suited to exercise the mind well in the process of acquiring them.

"With these views, I have endeavoured to classify, in some degree, the various branches of study commonly taught at school, with others that seemed desirable, in three divisions,—those which are useful, principally, as conveying knowledge of some kind; those chiefly useful as exercising the powers of the mind; and, thirdly, those which combine in more equal proportions the utility of the former two, imparting valuable knowledge, while they exercise thoroughly the mental faculties during their reception of it. My preference would, if I were free to choose my course, be given to the third class of studies, though not, however, to the exclusion of the other two; I quite agree, therefore, with the remarks, at the head of the second page of your letter, on the advantage to workmen of some knowledge of the sciences, and should add that such knowledge is as necessary to the master as to the workman himself, and not unimportant to all who have to judge of work, or to make use of its products. In other words, I think that some sound and systematic instruction in the principles of the more useful and, generally, interesting of the natural sciences, is a very needful part of a good education for every class, and that these subjects may be so taught as to make them very well fitted for the exercise and cultivation of the mind; as much so as those studies which have hitherto held the chief place in education.

"I. and III. Respecting improvements in the course of education, in the Proprietary and Endowed Grammar-Schools. Whether any change can be made in the latter, consistently with the terms of old endowments and charters, I am not able to judge; but that extension and improvement of the course of studies in both are very desirable, I do not at all doubt. The kind of education in both classes of schools is generally, I believe, a classical one, more or less exclusively. Now, though I do not wish to see the classics altogether excluded from our schools, yet it does not seem to me wise or right that they should continue to be rated above everything else. There has been a time, perhaps, when there was comparatively little else to teach, but that time is past now. I admit fully the utility of the classics, as a sort of gymnastics for the mind, but cannot allow to them a monopoly of advantages in that respect.

"The same end may be attained by the means of other studies besides these, and as successfully, I think, if that object be kept in view, and the manner of instruction adapted to it. It is often said that the study of the classics tends to the cultivation of good taste: but, admitting it to be so, they do not possess this quality exclusively, any more than the other; our own literature is surely not less adapted for this purpose. Why should not English grammar be more thoroughly and scientifically taught in our schools, and English composition and literature be more carefully attended to? There is a field here for the exercise of thought, industry, and good taste; and there are other and quite different ways of cultivating the taste,—an object

which I believe to be of no slight importance in education. But is this effect of classical learning altogether so certain? There is a somewhat close, and generally admitted, though not easily definable, relation between good taste and good morals; and of the tendencies of classical studies to vitiate the morals I am strongly persuaded, and that no purified editions can remedy the evil, for these are designed to meet one form of it only, and do that very partially. False or very imperfect ideas of morals in most respects — veins of heathenism — run through the authors read at school. The best are by no means free, others are very bad indeed; and, though it is possible for a teacher to derive lessons of Christian morality from them in way of contrast, yet it requires no common judgment, tact, and alertness on his part to do it well, and after all it seems hardly doubtful which will be the more readily received and retained by the scholar,— the false principle or its corrective. In reading the classics with my pupils, I always try to follow this plan, yet I am often dissatisfied with my attempts, and with the necessity which custom and conscience together impose upon me.

"Moreover, a knowledge of these dead languages is, when gained, to most persons a comparatively barren acquisition. They contain but little information, I believe, of any value to the many, that may not be more readily obtained in other ways. And, whatever may be their future fate as a branch of ordinary school education, there will probably always be a sufficient number of persons naturally disposed for the prosecution of such studies, to serve the purposes of historical and ethnological inquiry, biblical criticism, and so forth. It is argued that they aid us in understanding our own language; but a very extended and critical acquaintance with them is not necessary for this, and we have continually before us examples of correct speakers and writers who have nevertheless no acquaintance with them at all, or so little as to amount practically to the same thing.

"On the other hand, the ignorance about most objects of common concern to us,—as the sciences, social economy, and the like,—of so many whose education has been of this exclusive kind, is not only ludicrous and lamentable oftentimes, but, from their ordinary position in society, must be injurious in no small degree to the interests of the country.

"On many accounts, then, I think it is to be desired that the course of study in our Grammar and Proprietary Schools, and in schools generally for the middle and higher classes, should be much extended, so as to admit of real and efficient instruction being given on several subjects (our own language, the elements of the more important sciences, and drawing among them), which at present either hold a very secondary place, or have obtained no footing at all, in the usual course of school education. I should say there could be no doubt about this, did I not know that there are many who see no necessity for any such change, and not a few, who, while professedly agreeing in these views, are practically on the other side. For the studies in question do not deserve to be treated supplementary to a classical course, and to be pushed in at odd hours; but they ought to have equal rank and consideration with the latter, as equally important and necessary parts of a good education, and to have therefore a

full share of time allowed to them. If such a plan should become general, a consequence of it would probably be, that the average classical attainments of the scholars would be less; but notwithstanding this, I am persuaded that the gain would very far overbalance the loss, and that it might be regarded as a very great reformation. Yet I think it ought to proceed from within, and not by authority of Government, which cannot justly, nor without serious evils, dictate a course of study for all schools, however that course may be an improvement upon existing ones. In France, I believe, this is done as well as in many parts of Germany, and it is one of the mistakes in legislation of our neighbours which we should rather take warning from, than try to imitate.

"The influence of so important a body as the Society of Arts, if brought to bear fully on such an object, would probably be sufficient to lead public opinion, and so would accomplish the work, more slowly, perhaps, yet more safely and effectually, than any authoritative intervention of the state. Many of the principals of schools are, if I mistake not, quite ready to join in such a work, though with public opinion unaiding or opposed they can do but little.

"IV. That aid should be afforded towards furnishing a supply of models, apparatus, &c., I should think very desirable, provided it can be done with impartiality, and without detriment to the interests of any existing schools, private ones particularly, which are already moving in the right path. To favour and assist, by any application of public money, one class of schools, at the expense of others honestly working in the same field, would not be just nor wise.

"V. That systematic and defined courses of study be recommended, I think a very important suggestion. Occasional and popular lectures on scientific subjects are a step or two in the right direction, better than nothing, but they are not enough. To be of much value in education, it is needful that the scientific instruction introduced into schools should be made part of the regular scheme, and be taught with a view to the cultivation of the mental powers, as well as to the communication of facts. It is the business of the schoolmaster, I think, to deal chiefly with principles, whether it be in physical science, or in grammar, arithmetic, or other subjects of study."

From the Rev. John Barlow, M. A., F. R. S., Secretary of the Royal Institution.

"There can be no doubt, but that the so-called Grammar-Schools, in many large towns in England, were once all but inefficient. This state of things, however, resulted less from inability in the trustees, or other authorities, to discern what were the fittest subjects of instruction, with respect to the classes for whom these schools were founded, than from general carelessness and indifference to the subject.

"This evil is, as I believe, in rapid progress of amendment. Accordingly, I understand the inquiries of the Committee on Industrial

Education to be framed solely with a view of assisting those schools, &c., the rulers of which really desire to fulfil their duty.

"These questions have reference to two very distinct establishments:

"1. Schools of all denominations, excepting, perhaps, those connected with the Universities of Oxford and Cambridge.

"2. Mechanics' Institutions.

"First, in reference to schools,—it appears to me that the object of a school is, partly to impart that peculiar kind of knowledge which cannot be acquired so easily or so thoroughly as in early youth;—and, partly and principally, to form those intellectual habits without which no knowledge can either be truly possessed, retained, or applied,—the habits of concentration and direction of thought.

"For this purpose I would suggest, that school teaching should be limited chiefly to —

"1. Writing from dictation; bookkeeping; arithmetic, scientifically taught, stress being laid on fractional and logarithmal arithmetic—and constant exercise in mental reckoning.

"2. Algebra, as giving the principles of arithmetical operations.

"Geometry,—rudiments of application of algebra to curves. Trigonometry. Outline and perspective drawing; this is much neglected, but very important.

"4. Instruction in the French language.

"5. Geography and history.—This course of study would, in my judgment, amply occupy the time which is usually spent by a boy at school.

"I do not quite collect, from the Committee's letter, what they intend by the term 'Industrial Instruction.'

"But I think that, if rudimentary instruction in physical science, chemistry, botany, geology, &c. be introduced at all, this should be done sparingly and by way of recreation. There is always great danger of the vague generalities which must more or less enter into lecture-teaching on such subjects, disturbing that accuracy which I hold to be essential to the success of early instruction.

"With respect to Questions VI. VII. VIII., there can be no doubt that the suggestions contained in them are excellent, assuming always that the subjects encouraged, and the system of examination adopted, were unexceptionable.

"Second.—As to Mechanics' Institutions, the question assumes a very different aspect; they might become, to such schools as I have contemplated, what the *école des arts et métiers* is to the schools in France. There seems no reason why that peculiar branch of knowledge which requires to be especially cultivated in rural districts—in mining counties—in manufacturing towns—should not be pursued in these establishments with the utmost energy, and with almost exclusive attention.

"This energy and this power of attention, being brought, in addition to proficiency in elementary knowledge, from the school.

"Each such Mechanics' Institute, if appreciated, would be a self-governed and self-supporting academy, for the particular speciality which the wants of the neighbourhood indicated, whether agricultural chemistry, manufacturing chemistry, mechanics, metallurgy, &c."

[3909.]

The Rev. H. Cotterill, M.A., Principal of Brighton College, writes,—

"The circular letter, which I have had the honour to receive from you, refers to a question which has for some time engaged my attention, in its bearing on the education of the upper and middle classes of this country. During the last two years, as principal of this college, I have had opportunity of observing the increasing demand for practical instruction amongst these classes, arising not only from the necessity which compels a greater number to seek the active employments of life at home or in the colonies, but also from a growing sense of the importance of such knowledge to every Englishman, who would not exclude himself from the great and honourable pursuits of his own nation in the present age. The question which has presented itself to me for consideration, and which I am attempting (I think successfully) to solve, is whether it is practically possible to give this instruction, without forming a separate and quasi-professional department for such students, but as part of the general course of a liberal education. I have considered, that even in the case of those young men who should hereafter enter into employments in a certain sense industrial, the best preparation they could receive would be given, not by confining them to some technical instruction which might render them skilful in their future callings, but through such an education as might enable them to bring to their several professions a mind well informed and cultivated, and liberal and comprehensive views.

"With reference to this class of students, I trust it will not be considered irrelevant if I observe that it is not classical learning in itself, but the particular form that classical scholarship has assumed in England, that forms the chief impediment to a sufficient amount of industrial instruction. It is perfectly possible to combine, in all students of ordinary intelligence who are well taught, a thorough training in practical science, and an accurate knowledge of one at least of the learned languages. It appears to me of great importance to the cause which your Society advocates, that this fact should not be lost sight of, and that classical learning should not be confounded with an art, which can only be acquired perfectly by long and painful practice,—that of composing with ease, both in verse and prose, in the learned languages. I do not question the value of this art to all whose chief object is to become classical scholars; but the question ought to be, not whether industrial instruction is consistent with the attainment of this facility, which in most cases it is not, but whether it is not perfectly consistent with a good and sufficient knowledge of the classical languages, an acquaintance through them with the great minds of antiquity, and a clear and intelligent perception of all that is beautiful and noble in ancient literature.

"It may seem almost superfluous to insist upon the necessity of a thorough training in elementary mathematics as a preparation for all scientific instruction. But it cannot be too distinctly recognised that there is no royal road to science, and that it never can be learnt effectually and thoroughly except through a practical familiarity with its rudiments: viz., algebra, the science of numerical relation, and

geometry, that of form, with trigonometry; and ultimately, when the mind is capable of apprehending, with the differential and integral calculus. Without the first of these, at least, a popular knowledge of mechanics and hydrostatics, for instance, is of very limited and doubtful advantage; and science thus taught can never be living and progressive. I feel assured that in nothing will the Society more effectually further their cause in all schools, than by promoting good mathematical instruction, such as may supersede the irrational and mechanical processes by which boys taught merely from books, by masters with no scientific power themselves, learn either to dislike mathematics, or to acquire the fatal habit of performing mathematical operations without understanding them.

"While this foundation of elementary knowledge and discipline is being laid, it is not only possible, but on all accounts desirable, to combine with it practical instruction in science. That this may be done from an early age, not only without injury to other studies, but with advantage to them, if practical science holds its right position and due proportion in the system, I am thoroughly persuaded. Anything that will interest the mind of a boy, and call out his intellectual powers, is of incalculable value. Experience proves that many apparently dull boys, who could not construe a line of Latin correctly, or apprehend a single principle in mathematics, will kindle into intelligence when the facts of nature are explained to them, or when studies suited to their tastes give them confidence in their own powers; and in all cases, if instruction of this kind is judiciously applied, it is a recreation from severer studies, instead of another; a general impulse is given to the character, tastes are cultivated which would otherwise lie dormant, habits of accuracy are formed, all which is so much gained to the general education; and in the meanwhile, by commencing this instruction at an early age, the quickness of hand and eye, essential to future success, is acquired by many who, at a later period of life, would not be able to attain it if they were willing.

"As regards the method of communicating this knowledge, lectures, with experiments, or other suitable illustrations, are doubtless of use in a school; in some objects, especially, they are well suited to awaken a general interest. But I am very decidedly of opinion that, in the education of the young, very little will be gained towards the results which the Society proposes, unless, in addition to experimental lectures, there is a course of practical instruction in science.

"In order to explain my views, I will state the results of my own experience in this college. That branch of practical science which I have been most successful in grafting on the general system of a liberal education, is chemistry. In this, and the physical subjects connected with it, there is an experimental lecture once a fortnight; and by these an interest is excited in the subject, and something is learned. But the real students are a comparatively small class—not more than twenty, who once in the week work in the laboratory, under the direction of the chemical demonstrator, Mr. Medlock. To show the nature and amount of instruction that can be communicated under such circumstances, I enclose a paper set to this class at the Christmas examination, which was completely answered by many of them. This class consists of boys, from thirteen to eighteen years of age, who had not received instruction in chemistry for more than a

year, and the greater portion of whose time, it will be remembered, is devoted to classical and mathematical studies. Among them, I may add, I do not know a single instance in which this new pursuit has been an injury to their other studies; though there are many to whose minds it has given a stimulus which before was wanting.

"I am aware that Dr. Whewell, a high authority on such a question, has expressed an opinion adverse to the introduction of chemistry into a system of education for the young. As an instrument of education, in its highest sense, it is certainly not suitable, both on account of its empirical character, and because it is peculiarly a progressive science. But when used, as I maintain all such sciences should be used, at least in education of the highest order, namely, as engrafted on the general course, I believe that chemistry is better adapted than any other for such purposes. It requires an almost mathematical accuracy, both in observing and manipulation; it teaches the necessity of a simple and philosophical classification and nomenclature, and the use of a symbolical language. It is taught practically with great facility, and at less expense than natural history or geology; for example, the materials for chemical experiments being readily obtained everywhere. These considerations, independently of its great importance in all departments of industrial employment, indicate chemistry to be the branch of physical science best adapted for introduction into schools of geology. I am not disposed to think it suited for this purpose; but it may be introduced incidentally in the study of geography; which, in our system of education at the college, holds a very prominent position, and is, undoubtedly, when taught properly, and in connection with the physical features of each country, of the highest value to all students, whatever may be their future destination in life.

"There still remains this question of practical instruction in all that may be termed applied science, in which I include such things as experimental mechanics and hydrostatics, surveying and civil engineering, geometrical drawing, machinery, and the science of mechanism. These require and call into exercise somewhat different powers from those which are cultivated in the study of physical science. In this college instruction is given in some of these subjects, with the same views, and on the same principles, as in the physical sciences; but this branch of instruction, to be complete and effective, requires more appliances, and is attended with greater expense, than the other; nor are its results so apparent. In every large school there should be, in my opinion, the opportunity allowed for practical instruction in both these branches of natural science, and applied in one or the other, of which every pupil in his progress through the school might receive all the training that would be necessary; while those who are preparing for industrial employment, whose classical studies should be somewhat modified to enable them to devote more time to mathematics, could acquire sufficient knowledge and skill in both branches. But as in most schools it would be impossible to teach both efficiently, and a selection must be made, I am of opinion that the first step should be to introduce practical instruction in chemistry. If the Society should succeed in their endeavours, only so far as to induce and enable the endowed and other schools throughout the country to adopt this change, they would confer a great benefit on succeeding generations."

[3443.]

From the Secretary of the Barnsley Mechanics' Institution.

"As one of the Committee formed to consider your communication, I am instructed to furnish a reply. We have the strongest sympathy with the design, and think it particularly worthy the attention of large communities, where sufficient scope for its development would be afforded, and where the great diversities of industrial occupation call for corresponding varieties in industrial instruction. The town of Barnsley differs from these large commercial centres in having a very limited population, and in cultivating a single branch of industry. An industrial school in this town could only cultivate one department, because scholars could not be found for any other. The department referred to is the linen-trade, more particularly the arts of design. This is the great want of our town, and we have manufacturers who would cordially co-operate with our Mechanics' Institution, in providing a remedy. Industrial instruction in this department would be universally deemed a great boon; we have a notion that the more advanced pupils of the central schools of design might be trained as teachers, and might preside over districts, having under their charge several towns, to each of which, in their turn, they should render *evening* instruction. Our town is ripe for such an arrangement as this, and we think would furnish its due quota towards the expenses incurred.

"We quite coincide with the views expressed by kindred institutions, respecting the impolicy of the taxes on knowledge, and the desireableness that Mechanics' Institutes should be recognised as 'in the trade,' so that their shelves should be supplied at a much less cost than at present."

[2221.]

The Rev. W. R. Williams, M. A., and Head Master of Bodmin Grammar-School, writes,—

"I take the liveliest interest in the improvement of public education, and would be most happy to comply with any suggestions coming from authority.

"In my opinion, the only effectual plan would be for the *Government to establish public examinations in the different counties, into which all schools might send their boys to be examined together, and at which certificates of merit should be awarded, as well as scholarships and other marks of distinction.*

"This would give a tremendous impetus to all schools and parents.

"Of course, great care would be required in the appointment of the examiners, so as to secure public confidence in them. If this, on examination into its probable working, should be found practicable, I believe that it would do more than anything else to promote really efficient education among the middle classes. Whatever subject

formed the examination would be studied at the different schools, and *studied effectually* under such circumstances. Parents would soon find that they must not indulge their whims in moving their children about from school to school.

"These examinations should be held annually in some central town of each county, and candidates should not be admitted to them under a certain age, say sixteen, nor above twenty. The really good schools would then succeed; whereas at present, in most cases, the success of a school is all *chance*."

[2745.]

From the Secretary of the Mechanics' Institution, Bolton.

"The Committee cordially approve of the course you have sketched out, and would be highly gratified to expand our Institution so as to embrace industrial instruction as one of its objects, if they could feel themselves warranted in such an undertaking. But the apathy with which the working classes, as a body, regard our Institution, and, as a natural consequence, the limited resources at their command, prevent their undertaking any very important changes in the nature and management of our Institution."

[1899.]

From the Rev. W. D. West, Head Master of Brentwood Grammar-School.

I feel deeply interested in whatever concerns the education of the people, especially of the middle classes, for whose benefit, if I rightly interpret your letter, some great efforts are soon to be made. As you solicit an expression of opinion, I beg to state, that I should not consider any plan of education likely to be beneficial to the middle classes, in which the first place were denied to a sound training in grammar. As a foundation for other acquirements, and as a discipline for the reasoning powers, there is not its equivalent in any system of science whatever.

"Premising this, however, I am far from denying that very much may be profitably added to the old routine of a grammar-school."

[2179.]

The Secretary of the Brymbo Mechanics' Institute writes as follows:—

"I am requested by the Committee to say, very valuable assistance could be rendered to institutions by the supply of the best maps, diagrams, &c., at as low a price as possible.

"The periodical visit of an inspector from the Society of Arts would greatly tend to keep the institutions up to the standard of the times: many suggestions they might make would be the means of increasing the efficiency of the societies."

C.

[3473.]

From Mr. Robert Chambers of Edinburgh.

"I cannot but express my cordial concurrence in the views of the Committee on Industrial Instruction of your Society, with regard to possible improvements in education. As far as these views go, they seem to me beyond dispute; for experience has certainly proved that a training in the useful arts is an excellent means of developing the faculties of youth, while it is equally true that to found an increased technical skill upon general intellectual education would greatly promote some of the most important interests of our country. I must at the same time confess that I feel less anxious to promote an improvement of the means of material wealth, than to see a simple extension of *some* means of education to all; and that, if possible, under a system entitled to the term *national.* Nothing can be more manifest than that the people of this country are still only partially civilised, and that enormous evil agencies are at work to prevent their naturally excellent character from being developed in its best properties. It has long been the hope of good men, that a national system of education would be established, which, while seeking to enlighten, would also endeavour to moralise the people; but hitherto we have only obtained, instead of this, an increased activity of religious parties, each eager by this means to maintain its own ground; while the examples of Prussia, of Holland, of America, and of Ireland, fail to impress the conviction that there is nothing necessarily disrespectful or injurious to religion, in directing that it shall be taught at distinct times, and at distinct places. It is but too evident, that, from unreasonable objections and difficulties on this score, we are deprived of the highly needful benefits of national education, and the country consequently subjected to all the dangers which beset a state in which ignorance and its concomitant evils prevail; nor can I say that I at present see any prospect of a speedy remedy.

"In the event of a liberal system of national education being ever established, I should deem it sadly defective if it did not ensure that every child in the country learned something of the laws which the Deity has established in the world, especially those by which the well-being of his creatures is more immediately effected, and if it did not convince all that there is a way of rectitude appointed by God, to tread in which is happiness, and to depart from, misery."

[2673.]

From Mr. Walter Crum, F.R.S., of Thornliebank near Glasgow.

"I shall answer the questions contained in the circular as far as I can.

"1. We have but one partially endowed grammar-school in Glasgow, and that is not attended by the sons of tradesmen: it is managed by the town council. It does not strike me that any advantage would accrue to industrial education by being joined with it. Parish schools, I presume, are not intended here.

"2. Neither can I see much advantage in connecting industrial schools with Mechanics' Institutes. These are managed by amateurs, who can give but little time to them, and the space at their disposal is not sufficient for the increased attendance. The object in view is sufficiently important to demand a distinct establishment, with a constitution expressly adapted to it. I may misconceive the extent aimed at by the Society, but I should imagine that schools for teaching to the people the principles of science, illustrated in a manner worthy of a Government, would be attended by thousands, when schools of design are now attended by hundreds.

"3. If by these is meant the sons of proprietors, I think there is no need of separate national provision. They can go to some distance, and spend time at Universities. But if it means mere foremen, I would say the same arrangement would suffice; for foremen, like non-commissioned officers, first show themselves in the ranks: they are chosen from the workmen for superior intelligence, activity, &c. &c.

"4, 5. It is from these clauses that I fear a very moderate measure indeed is contemplated.

"6. I never liked prizes: the power which attainment gives is the great reward, and its justice is unquestioned.

"I have always advocated the dissemination of the principles of art and science among the people. I have taken some share in the promotion of that object, and am thoroughly convinced of its importance. I am satisfied that voluntary exertions will not effect it; for the people themselves will not pay for an expensive education, whose value is to them but distantly prospective, and it is vain to expect that private individuals in a community will continue, for any length of time, to subscribe money to provide it for them.

"If it is to be effected, then, it must be done by Government, or some such power. That I think is certain, but then come many difficult points. Does Government support involve a purely central management, and what is likely to be its character? To what extent is the education to be diffused? Will there be a few establishments, and these confined to large towns, or will advantage be taken of elementary schools in villages to give some idea of mechanics and the experimental sciences, if not of art? I ask this question, for otherwise comparatively few could take advantage of the training — which must be continued for a length of time.

"Then, as to the nature of the education contemplated, — Dr.

Playfair's address embodies very much my views on this point. I cannot see what you are to do with applied science, until the principles are laid as a foundation. The pure sciences are known, they are communicable in a school, and attainable there to a certain extent within a limited time, but not to be had in the workshop; while, for technical instruction, you have, and can have, so far as I can see, no teachers worthy of the name: the diversity is boundless, and it can be only learned in the workshop during an apprenticeship, which a young man enters upon perhaps immediately after he finds which trade is within his reach.

"These remarks I make to show that I am ignorant of many facts well known to those who converse, often no doubt, with others on the subject in London, who know the probable means at their disposal, the general views of influential persons, the prejudices to be combated or avoided, and so forth. I should say that a comparison of views, between earnest and thoughtful men, who have been previously looking at the subjects from different points, would correct crude notions, and suggest to all of them lines of procedure which the most observing of us could not otherwise arrive at, and without which, I fear, our opinions are of little value.

"The subject is one in which I take a great interest, and would be glad to contribute to if I could."

[2826.]

From Mr. R. Coales of Northampton.

"The circular addressed to me on education, and requesting any suggestions I might be prepared to make, appears to refer to two objects, — the improvement of existing modes of education, and the extension of education among the lower classes.

"The suggestions I would offer could only form part of any general scheme for promoting education; but would, I believe, in themselves very materially assist both objects.

"The present very imperfect character of the education given to the middle and lower classes must, I think, be attributed chiefly to two causes, — deficiency in *practical skill* (not in *knowledge* of the subjects professed to be taught) in teachers, and no due appreciation of sound education, or ability to test the pupils' real progress in the subject generally. I do not think the quantity or quality of education at all commensurate with the means employed, or the money expended.

"If the Government could first devise some efficient system for training skilful practical educators, and, secondly, some scheme of examinations, which should be a reliable test of the education given in all schools, its interference, while avoiding everything inconsistent with the spirit of our constitution, or affecting the prejudices of the people, might, I think, be made to gain the desired ends.

"With respect to the first, there are two ways by which the necessary training might be obtained — to form efficient teachers by

Normal Schools established for this object itself, and which might be made the means of reducing the cost of education to the lower classes; and by the encouragement of articled pupils. This would require some guarantee of the efficiency of the system under which they were placed; and this might be done by public examinations, on which I have now to offer some observations. They are these —

"1st. That there be public examiners of schools for districts (the present union districts, for instance), whose office should be to publicly and consentaneously examine all public, and as many private schools as should be willing to avail themselves of the opportunity.

"2ndly. That the prizes for proficiency in the various subjects, should be certificates entitling to appropriate *Government situations.* It may be supposed, if the masters of private schools should be backward in subjecting their establishments to a public test, that parents would then show a preference for schools which gave this guarantee of their efficiency; and especially where the pupils would have an opportunity of qualifying for a Government appointment.

"Moreover, articled pupils in these schools, and in these only, should receive certificates entitling them (under certain qualifications) to appropriate appointments,—masterships of normal or other schools, or the post of examiner.

"Immediate advantages: — 1st. The impulse given to the interest of the public generally in education: to the parents, and pupils, by the immediate and material rewards for proficiency; and to them and the masters alike, from the examinations taking place on the spot where they reside, and in competition with their neighbours.

"2ndly. As the Government would advance no system of education, and would merely test results, not only would an immense impulse be given to the improvement of existing systems of education, but that improvement would be left to the healthy stimulus of private competition, and the exertions of individuals for their own advancement.

"3rdly. The certainty of superiority in this profession being publicly recognised and rewarded, would draw into it its proper share of talent, and raise the position of the educator to its true elevation.

"4thly. There is also to be considered the facilities with which such a scheme of examination and rewards might be carried into execution, from the absence of any essential feature which could excite prejudice or party feeling.

"I would also add as further recommendations:—

"1st. The stability given to these institutions, since every man might hope to see his children in close connection with the Government.

"2ndly. The bringing to an end, or depriving of their force, the complaints of "neglected genius," and the increasing claims made upon the bounty of Government, as well as of private individuals, for their relief.

"3rdly. The removal from the character of public men the suspicion of abuse of patronage, and the consequent elevation of public morals, so much influenced by the example of the upper classes.

"4thly. The absence of any religious element of discord, since the education itself would be left quite free from direct Government influence.

"5thly. The probability that local governing bodies, as of counties, boroughs, &c., and of private companies, as of railways, would require from their officials certificates given at their examinations. This might not stop here, as they might be required for every office of trust, down to domestic servants; all which would give a stimulus to education, scarcely less than that from the original Government rewards.

"6thly. That the best men would thus have an opportunity of entering the service of the country, which would therefore have its business performed in the best manner, and abuses gradually removed. This would also apply to those great companies whose interests are almost identical with those of the public.

"7thly. The last reason I would advance is, the *justice* of such a mode of appointment to situations under the Government: as all these offices belong to the nation, the nation ought to know on what ground they are bestowed; and, further, each individual might fairly claim an opportunity (however remote) of gaining them for himself or his family."

[2490.]

Mr. W. Charley, linen-bleacher, of Seymour Hill, near Belfast, writes,—

"I have the honour to acknowledge the receipt of a circular from the Committee of the Society of Arts, &c.

"The subject treated of in this interesting document is one deserving the most serious consideration, and I believe every enlightened individual in the kingdom will sympathise with the praiseworthy efforts of your Society to advance the intellectual condition of the industrial classes.

"I, for one, have long felt the necessity of such a step in the linen manufactures of the North of Ireland, knowing, as I do, the frequent loss occasioned in many of its branches by the ignorance of the persons in charge. For instance, the *bleaching* of linen is a most difficult process, requiring the greatest care, knowledge, and experience: this important branch has until lately been under the control and superintendence of uneducated foremen, to whom the gentlemen employers generally left the entire management; many of these men were scarcely able to write their names, and were merely superior workmen. No wonder, then, the irregularity and uncertainty of the process became proverbial, and is in many parts to this day. I am happy to say that of late a decided improvement, in this respect, has taken place here, and that several firms (including my own) have succeeded in procuring scientific men to conduct this most difficult and important department of our staple manufacture. The result has been a higher style of textual appearance and durability, and increased dispatch, combined with diminished expenses. This has all

been effected by scientific knowledge being brought to bear on the question, with a judicious admixture of practical experience.

"The march of improvement still goes on; and, as far as I can judge, we are a long way in advance of those old countries to which our forefathers were originally indebted for the rudiments of the manufacture. Still, however, the number of really scientific men employed in the linen business is very limited, and among the labouring artisans there is much want of enlightenment; to increase the former in *number* and the latter in *knowledge* must, therefore, be most desirable: we have already several societies established for this purpose, such as, to some extent, the Royal Flax Improvement Society, and the Chemico-Agricultural Society of Ulster, &c., &c.

"But if these remarks apply to the linen manufacture, how much more forcibly will they do so to those engaged in the more mechanical arts, viz., to workmen and designers in wood, metal, and stone! On the perfection of their laboured delicacy of finish depend, in a great measure, the profits arising in business from improved machinery, and, indeed, much of our domestic comfort.

"Every one knows the great annoyance to which, through injudicious planning, our dwelling-houses sometimes expose us, such as intolerable draughts of cold air, impure gases caused by smoky chimneys, and imperfect ventilation. These difficulties will be more easily overcome, when the laws of nature are more generally understood.

"As I feel deeply interested in these subjects, I am afraid I have been led to enter at too great length into showing our deficiency, and our want of universally diffused scientific knowledge; for the present age is no doubt distinguished by its immense strides in the direction of improvement in this respect, and its great advance in the last century. Much is, however, yet to be done: we are only comparatively beginning to subdue nature to our uses; and if Providence mercifully spares us from the calamities of war, and thus allows our talents peaceably to be developed, the next century will be as much superior to the present, as certainly the present is to the past.

"I think the Government schools of design, or perhaps, in this country, the new Colleges, might be extended so as to include a department for industrial science *of the superior order*, for the instruction of *managers;* and that the Mechanics' Institutes of the various manufacturing towns could enlarge the principle, and carry out the details of conveying instruction to the labouring artisan.

"I can only say in conclusion, that any suggestion I can give, founded on my own experience, shall at all times be most cheerfully furnished to you: and, with best wishes for the success of the undertaking."

From the Rev. T. Brown, Prebendary of Chichester, and Head Master of the Cathedral School.

"Sir, — I agree with much that is written in the letter which you have done me the honour to send me. I think with you, that 'existing educational foundations, such as the endowed grammar-schools,

might be extended so as to meet the wants of the times.' I am for the reformation of them in the way you seem to suggest; and yet I would by no means have them cease to be grammar schools, that is to say, schools wherein youth are instructed in the 'learned languages,' because I am sure, that pursuing that kind of instruction, they have sent into the busy world many of the brightest characters that have adorned our nation. Even this very contracted institution has laid the foundation of the literary fame of some very distinguished men in ancient and modern times; some of whom, it is very reasonable to think, would not have been known to the world, but for the existence of the Chichester Prebendal School. Still I incline to the opinion, that there is plenty of room for the expansion of our course of studies; and I heartily wish that such an improvement may soon be effected.

"Instead of speculating on what may be done in other establishments of the same kind, I will just observe, with respect to this, that its origin dates, perhaps, from the first foundation of our cathedral; that it was reconstructed by Bishop Storey about 1470, who bound by statute the prebendary of Highley to the office of headmaster of the grammar school, which was founded, as the statutes speak, 'Ob ignorantiam sacerdotum aliorumque dioceseos hujus;' no doubt it was designed for the early education of the clergy. The funds of the said prebendal stall of Highley became its endowment, and they doubtless were ample until the system of leasing such property came into vogue. But now the property of the stall, consisting of tithes, being leased on lives, and having been so for many generations, the funds are in a most unsatisfactory state, having produced to the prebendary, or head master, not more than 30*l.* a-year on the average during the last fourteen years.

"The first thing, therefore, necessary, to any plan for the extension of this school, or any other in a similar predicament, is, — the redemption of some of that property which is locked up with the lessees. This might be effected, I think, by the Ecclesiastical Commissioners, who might purchase vested interests, and take the management of the estates into their own hands, and award a fixed and certain sum as salary or stipend to each master or tutor of every such school. Then the designs of your Society might begin to be carried into execution. Provision might be made for extending the curriculum of our studies, by introducing among us 'instruction more practical in its objects, and bearing more directly on the actual realities of life, than that now generally given.'

"In a city like this, a Polytechnic school would, one might suppose, meet with many supporters, and do much good. Latin and Greek would flourish by the side of the arts and sciences; metaphysics and natural philosophy might go hand in hand, and Aristotle's Organon might be on friendly terms with Watt's Steam Engine. Nor need we turn our backs on the more humble occupations of the mechanic and artisan, the agriculturist, and the question, 'quæ cura boum, qui cultus habendo sit pecori.'

"The proposed supplying of 'maps, models, diagrams, and apparatus;' the founding of 'prizes, exhibitions, or scholarships,' — most excellent things for the encouragement of learning, — must follow the provision of funds for the maintenance of masters or tutors.

"Until this provision is made, it will be useless to offer any further suggestions as to the matter in hand."

[2861.]

Mr. J. T. Clay of Rastrick, near Huddersfield, writes,—

"Your circular of the 5th February, on the subject of Industrial Schools, only reached me last week. In accordance with your request I willingly respond to it, though I am aware the views I entertain do not altogether coincide with those shadowed forth, if not fully expressed, by you.

"I may premise that any observations which I shall make, bear reference to that portion of the population who are engaged in the textile manufactures of the West Riding of Yorkshire.

"All persons who, like myself, dwell in the midst of a manufacturing community, must be aware of the fact, that a low standard of education and taste generally prevails, however they may differ as to the best means of elevating that standard.

"The general institution of schools, on the National, British, and other systems, has, no doubt, done something towards the attainment of this object; but I fear that most of their promoters have been disappointed that greater results have not been attained. This, I conceive, has arisen in a great measure from the circumstance of the children being generally taken away to labour as soon as they have overcome the first difficulties of education—just at the time when the masters are beginning to see the first fruits of their exertions. This being the case, it appears to me very unlikely that children and young persons could be brought together to these proposed Industrial Schools, if established.

"Another great difficulty in this district would arise from the largest portions of the operatives living in scattered villages and hamlets, extending over a large extent of country; and this custom prevails in other manufacturing and mining districts. Leeds and Bradford are of course exceptions to this rule, but such opulent towns should not require especial assistance.

"But the grand objection which I think lies at the root of the whole plan (so far as I can gather the intentions of the promoters) is, that it seeks to benefit particular classes at the cost of the public generally.

"I must also differ from those who think that there is a lack in this country of efficient workmen; and I hold the opinion that when a demand for any description of skill arises, that demand will in due time be supplied by natural means, without any of that fostering care which some recommend. As regards the branch of trade with which I am best acquainted, I have no hesitation in saying that the public taste has for many years acted very prejudicially towards the most skilful operatives, the great demand having been for goods of a cheap description, which do not require the most perfect workmanship; and

it has been a great anomaly, that men employed on goods of inferior quality have been better paid than those who have been engaged on fabrics requiring greater skill; and I regret to see a large amount of talent lying dormant, or badly remunerated, for want of sufficient encouragement. Still if the course of trade causes both masters and men to find it to be their interest to cultivate cheapness, with extended production, at the cost of perfection, any artificial counteracting movement cannot be attended with success.

"Having thus troubled you with my general views, I proceed to reply to your queries *seriatim*:—

"1st. The general diffusion of existing schools for the children of the working classes, will, I think, benefit them more than any interference on their behalf with the grammar schools: these are comparatively few in number, and not generally situated in manufacturing localities; besides this, I consider they fill a very important office in affording assistance to a class of individuals, who in these days are the most neglected portion of the community, viz. those who, with limited means, are desirous of maintaining a respectable position in society—say clergy and other professional men of small incomes, persons in reduced circumstances, widows, &c.

"That a more extended sphere of instruction would be advantageous is evident, and many of the masters are voluntarily improving the system; but I consider it would be neither just nor prudent to turn them into industrial schools.

"2nd. Mechanics' institutions are, I fear, too often supported but in a small degree by artisans, many of the members being clerks, shopmen, &c.

"3rd. As I have before stated, I see a large amount of talent unemployed; and the class which of all others appears most in excess, is that composed of young men of fair education, who do not find in this country sufficient scope for their exertions, as is proved by the large proportion of the emigrants to Australia, &c., who are of this description.

"4th, 5th, and 6th. Self-reliance being my motto, these extraneous appliances are not needful. I doubt the good effect of prizes, exhibitions, &c., in the cases mentioned, therefore could not recommend their extension. Let all existing obstacles to the diffusion of knowledge, as the duty on paper, &c., be removed, and allow all classes free scope, and they will apply themselves to those pursuits which are more profitable to themselves, and therefore most profitable to the country.

"Two of the most important manufactures in England, viz. cotton and earthenware, have reached their present position without any adventitious aid; while France with her scores of Gobelins, on which thousands have been lavished, cannot compete with us in the production of articles used by the millions, from which, after all, the profit of trade arises, for continued observation has convinced me that works of high merit are rarely remunerative."

[2296.]

From Mr. Thomas Clegg, of Manchester.

"I cordially agree in your *main* object, and particularly in your effort to *remodel* those much abused free grammar schools, and I hope, if in your power so to do, you will encourage and countenance, by either lectures or papers from such men as the late Reverend Mr. Willis of Ludlow, who sacrificed his life in this cause, Mr. George Griffiths of Kidderminster, Reverend Robert Whiston, and others, who, perhaps, labour as arduously, but in a more humble way, and consequently are not so well known. Let the above not frighten you, nor my telling you that I am one of those (supposed) radical churchwardens of Manchester (Birly, Morley, and Clegg,) who lately obtained an act for distributing the rectorial revenues of the parish to the whole of the incumbents, instead of confining them to the dean and canons, who notoriously did *not* do the work. I will be no party to *destroy*, but wage war against *all abuses*, and shall gladly do what I can to encourage what I believe to be right sort of education; and here, perhaps, you may think me as much too exclusive or conservative, as others have thought me radical in the other case.

"My first principle being *always*, in *whatever you teach*, that Christian principle shall, *if possible*, be instilled at the *same time*.

"I have, from quite a boy, attended and taught Sunday and night schools, and seen a good deal, both of the working and the results of them, and believe that my convictions have arisen partly from this, and in a great measure also from being a considerable employer of workpeople from fifteen years of age, probably never having fewer than one hundred under my own individual management. My two brothers and myself have now probably not less than from 1200 to 1500 people in our employ. I have seen a good deal of working people as secretary to the temperance society, sick club, news rooms, &c.

"A gentleman in Manchester, who has probably done as much as most benevolent masters in town, and who has men in his employ in great numbers from seven to twenty-one years' duration, but who, I believe, has gone upon an opposite tack to the one I start with; viz., never touch or meddle with religion, but provide your men with newspapers, periodicals, and every other kind of means of improving themselves, &c. This gentleman has lately had a turn out of these men; I believe it cost nearly 10,000*l*, during which neither his *life*, nor that of any of his family was safe, nor any portion of his property; but it was frequently destroyed, I believe, in the most reckless manner.

"This gentleman now, from the most benevolent, is become perhaps the most narrow-minded; believing, as he told a friend of mine, that education to a working man, instead of a good, was a positive evil.

"This is not a singular case either; for I know a very intelligent and humane gentleman, the steward for a large landed proprietor, who had many collieries, and who stoutly maintained the same opinion: I believe, in both cases, because the education given *had been of the wrong kind.*

"I have always maintained, against all my friends, that those parties

that have been educated in the schools that I have been connected with, will always do *more work* for the *same money*, and *do it better*, and *with less trouble*, than those that are not educated, or educated without religion; and I have always been in a position to prove it so.

"With your first suggestion you will have seen already I quite coincide, and I hope you will vigorously follow it up.

"You may add your element, the mechanics' institutions, *if you go about it cautiously;* but as they are as much used for *relaxation and amusement* as for real improvement, you will have to make your courses as attractive as possible.

"With regard to proprietary schools, you will do well to show them that many shoot entirely *above the heads of the people*, and attempt something that neither does the school or the children any good. If men are to succeed in business, give them a business education; if to be professionals, send the children to schools of that class; and although a man can never know too much, still a professional knowledge frequently not only unfits a man for business, but at the same time gives him a distaste for it.

"With regard to aid, as per No. 4., it should be very *cautiously given*, and jealously watched to see that you get value received in the improvement made; for almost everything has a tendency now to pauperise instead of elevate and make independent the *working man*.

"No. 5. is absolutely necessary in every system, if to succeed.

"No. 6. very desirable also, but will want due consideration.

"No. 7. Public examinations I scarcely think desirable; and that it would be *quite stimulating enough* if parents, &c. were allowed to be present.

"No. 8. very desirable, and would always enable a deserving person to reap the benefit of it through life.

"I must now suggest that, whatever else you do, you establish a system of *evening classes in all institutions that it is possible to throw open;* and, if possible, make it fashionable to go to them, and thus make what amends you can for early neglect in parents, &c.

"In grammar schools, and, indeed, *in every case where possible*, place the school under *Government inspection*, whether night or day, Sunday or free school. Get it made *imperative* to have the accounts audited and published annually, under the guidance of the principal *parish* or municipal annually appointed officer.

"Have *annually* appointed governors, one-third only eligible for re-election within three years, in all cases where the funds are either left for charitable purposes, or raised by the public in *any way whatever*."

[2500.]

The Committee of the Chatham and Rochester, &c. Mechanics' Institute, report as follows: —

"We cordially agree as to the provision of models, casts, diagrams, &c., and also that the publication of school books in a cheap form, as proposed, would prove most beneficial to distant institutions; but to

those in the vicinity of London, books may be had at from 17 to 20 per cent. discount; and we find no difficulty in this respect, though others far from town may.

"We are also of opinion, that industrial instruction would be most beneficial, especially that of drawing, mathematics, laws of mechanics, and even music, in all of which the middle classes and working men would gladly unite; as, at present, the expense alone keeps back many of talent in ignorance of these branches of knowledge; and we shall most gladly unite our efforts as far as possible in carrying the same into effect. If a people's college could be erected in districts embracing three or four large towns, so as to be reached by short journeys, much good would be effected.

"Could assistance be given to enable committees to erect suitable buildings to carry out these designs of instruction, much good would arise. The next thing of importance would be, the supply of teachers, especially where the districts lay near London. One teacher might be employed for one or two days in each week to travel round, giving lessons at different institutions — say four or five: this would fully employ their time, and there would soon be found pupils who would be able to assist during their absence, and mutual instruction would soon make good progress.

"Granting certificates of merit would do much for youths in after life, as a stimulus to action.

"Day schools might also be established at every institution, and teachers appointed by the Government, at a small salary, and their income increased by charging a small amount to each scholar, say 2*d.* or 3*d.* per week; this would be a stimulus to increase their exertions, and to instruct their pupils, so to cause parents to send their children, finding the results to be beneficial to them, as well as advantageous to themselves."

[2096.]

The Rev. Charles Penny, D. D., Head Master of Crewkerne Grammar School, Somerset, writes, —

"I have long thought that the ancient grammar schools, if properly managed, might be made to meet the demands of the times.

"You ask me if maps, apparatus, &c., would be useful. I should say eminently so, if we could secure the aid of a gentleman competent to apply the apparatus. I think a staff of lecturers would do more than anything else to advance the objects of your Society, and can see no difficulty in realising that desideratum, if a small charge were made to each pupil attending the lectures; still the lectures should be at regular intervals, so as not merely to excite inquiry, but to keep it in healthy action.

"With regard to prizes, exhibitions, &c., they are undoubtedly of infinite benefit; and an essay connected with, or drawn from, any series of popular lectures, would, I believe, awaken a spirit of investigation, and do much to render the practical training in any branch of science, which may be adopted in after life, more efficacious to the pupil."

D.

[2395.]

From Mr. J. Davy of Ambleside.

"The high opinion which I entertain as regards the objects of your Society, in relation to national industrial education, and the hope that the like will be attempted in our colonies, and be founded by our Government, so that they may be made to feel that they are under a parental Government, deriving daily benefit from the union, and that the term Mother Country is not an abuse of language, induce me to reply to your circular.

"There is one measure which it appears to me is very desirable to have entered on. I allude to the inspection of our free schools, supported by endowments, throughout the country, — many of which I know are in a sadly neglected state, and few of which are conducted in the manner they might and ought to be,—so as to afford education to the children of tradesmen, and of the labouring classes. Mere power of inspection, without power of dismissal in these cases, I need hardly remark, will be of no avail. Were such power entrusted to the county magistrates, —not less than three acting together, with the approval of the Home Minister, founded on a report drawn up after due inquiry, — a great check, I think, would be given to existing abuses."

[2008.]

The Ven. Charles Thorp, D. D., F. R. S., Warden of the University of Durham, writes: —

"I beg leave to acknowledge your letter of the 5th inst., and to say that I consider industrial instruction to be of paramount importance in the present condition of society; and that I believe that it may be satisfactorily carried on in connection with the Universities, and in the North of England in the University of Durham, — an institution capable of giving important assistance to this work."

E.

[2041.]

The Secretary of the Edinburgh School of Arts, writes as follows: —

"Our institution embraces the following branches, each taught by persons eminent in their respective departments: —

Chemistry.
Mathematics.

Natural and Mechanical Philosophy.
Architectural, Mechanical, and Ornamental Scroll Drawing.
Ornamental Modelling.
French.
Structure of the English Language.

"These branches are taught with a special reference to *practice*, and are made to bear on the different trades or occupations which the student may be disposed to follow. This remark applies to all the above subjects, except French and English, which are general.

"We never change our subjects of instruction. We have a system of tuition, like a college, and would not accept the services of any itinerating lecturer, however eminent he might be. We may add some useful branch; but, if the addition is made, it must be permanent. The students have no voice in the management, though hints from them, if judicious, are thankfully received. The industrious classes know our system of instruction; they appreciate it, and approve of it, and attend our institution. Last year we enrolled 657 students; the number of tickets sold was 927.

"We have in town a School of Design supported by public funds, and in which the pupils are taught gratis. One of our lecturers teaches *practical* mechanics, but neither of these is in connection with our school.

"Our school — speaking of a number of years — is supported half by the fees derived from students, and half by public subscription.

"We have recently bought, for 2500*l.*, the premises which the school has long occupied.

"Our library consists of upwards of 2000 volumes, all or mostly all of a scientific nature, bearing on the subjects taught in the institution."

F.

[3716.]

From Mr. William Fairbairn, F. R. S., &c., of Manchester.

"Manchester, April 4. 1853.

"Sir,—Owing to the pressing and urgent nature of my engagements, I have been prevented giving that early attention to the subject of the circular I had the honour to receive from the Industrial Instruction Committee, I could have wished. The objects contemplated by that Committee are of such vast importance to the industrial classes of the community, that I have had some hesitation as to what description of institution should be adopted, and what changes are necessary to be effected in our national institutions, to meet all the requirements essential to a sound and substantial industrial education. That a better and more efficient system of elementary instruction should be adopted does not admit of doubt; and the want of such a

system is equally apparent to all those who have watched the progress of the mechanical and industrial arts since the introduction of the steam engine and the Peace of 1815. From that period it is obvious that the unprecedented increase of manufactures, the numerous mechanical inventions, the introduction of steam navigation, and the crowning discoveries of the electric telegraph and locomotion by steam, are in themselves sufficient inducements to urge the necessity of that preliminary instruction anticipated by the Committee, and so much in demand by those who are the sinews of our national ascendency, and the true supporters of our national wealth.

"It must appear obvious, that our recent discoveries in physical and mechanical science, their practical application to the useful arts, and the equally important discoveries in chemical research, have changed not only the pursuits but the relations of mankind; and, in place of those national distinctions, want of intercourse and community of feeling, which in former days separated, and not unfrequently embroiled nations in hostile conflict, are now, by the practical exercise of those very discoveries, united as one, having the same pursuits and the same interests at stake. As a witness of these changes, and from a conviction of their importance in ameliorating the several relations and the intellectual advancement of the industrial classes, I feel, in common with others, the importance of maintaining and perpetuating those valuable acquirements of enlarging our sphere of action by the introduction of a better system of education, and of giving to the working man the necessary facilities for the acquisition of knowledge.

"Under the impression that a liberal and sound principle of industrial education can be effected, permit me to draw the attention of the Committee to those classes of men whose vocations are of such importance to the public welfare and the public safety, as to require special attention in a moral as well as an intellectual point of view. I mean those classes which arrange themselves under the following heads:—

"1st. Millwrights and constructive mechanics.

"2nd. Engineers, marine and stationary.

"3rd. Locomotive engine drivers, and their assistant stokers.

"Now all the above classes require the utmost attention; and in order to point out to the Committee wherein they are deficient, I apprehend they will pardon me, if, in speaking from experience, I should notice defects and suggest remedies, which, in a national point of view, it may be desirable on the one side to avoid, and on the other to incorporate in the new system of education contemplated by the Committee.

1st. *Millwrights and constructive mechanics.*—Viewing the different classes of mechanics and artizans, as above enumerated, in their intellectual and social condition, it will be found that amongst those employed in the constructive arts, millwrights, taking them as a body, are probably more intelligent than most others. This arises from the nature of their employment, and the variety and form under which this description of machinery (namely millwork) is executed. The erection and construction of mills calls forth the dormant energies of the individuals employed at it, engenders reflection, quickens the

intellect, and leads to the removal of difficulties with a facility that could not otherwise be accomplished.

"Here the division of labour is not so easily effected, as a good out foreman millwright must depend upon his own resources, and not only work himself but give directions to others in the execution of an important duty, which embodies all the multifarious operations of spinning, weaving, grinding, rolling, &c. In fact, a good millwright should be to a certain extent a 'jack of all trades.' He should be able to forge and turn; to work in wood, iron, and brass; to erect steam engines: and all this he should be able to accomplish, exclusive of his knowledge of machinery, in the arts of printing, dyeing, grinding, spinning, weaving, &c. All this he should also know, as well as a few leading principles in physics, and those branches of practical science which bear directly upon his professional avocations, and which render his services of great value, when employed at a distance beyond the reach of workshops, in the erection of machinery of such varied forms and uses.

"To this class of men, a sound preliminary education and a knowledge of the exact sciences would be invaluable.

"*Engineers, marine and stationary.*—These men are of such importance to the community as to require a separate notice. They are contemporaneous, and have sprung into existence with the steam engine and steam navigation, and forty years ago there was scarcely a person to be found under the name or title of an operative engineer. The discoveries of Watt, the extension of the manufactures, and the introduction of steam navigation, established a new era in the history of mechanical science; and the introduction of railways and steam locomotion not only created demands for a profession before unknown, but it changed the relations of society, if it did not almost realise the fabulous tales of the Arabian Nights. With these mighty changes came a new class of mechanics and artisans. They entered upon their respective professions without knowledge and without experience, and their only school was the workshop, the engine room, and the 'stoke hole.' With such instructions and with such materials is it to be wondered at that blunders and accidents should frequently occur, and that the lives of the public should be left in the hands of men whose limited knowledge does not enable them to judge and reflect upon the responsibilities attached to their several duties?

"To such a class a school of physics and practical science, united to a correct system of moral culture, would be of incalculable benefit to themselves as well as the public.

"*Locomotive engine drivers, and their respective stokers.*—The locomotive engine drivers and stokers have only been known to us for the last twenty years, but they constitute at the present moment an important branch of the industrial community, and so far as their acquisition of knowledge and respectability of character is concerned, we are all, individuals as well as the public, deeply interested. Engine drivers and stokers above all others should have a regular and rigid course of training. They should have a keen eye and a clear perception, they should be taught care and attention to signals and every minutiæ connected with the rules and government of the lines on which they are employed, and, above all, they should be instructed

in the management of the engine, the value of time, and the absolute necessity of working the distance according to the time table and those established rules by which they and the public are to be governed in their departure from, and arrival at, the different stations. A driver should also be acquainted with the principles upon which the steam in the boiler is generated, its elastic force, the security and free working of the safety valves; and, in fact, in order to prepare him for the public service, he should attain his degree and character in the Working Man's College before he was considered eligible to mount the footplate or to handle an engine. Lastly. Other classes, such as blacksmiths, carpenters, masons, bricklayers, turners, tilers, moulders, &c., exclusive of innumerable others, such as spinners, weavers, dyers, printers, &c., employed in the manufacture, might each of them reasonably demand to be included in a national system of industrial education. The Committee, in the exercise of their powers, will not however forget what is due to those important classes. In my opinion, the great and important object to be attained in the extension and establishment of educational institutions, is to engraft upon the mechanics' institutions elementary classes for industrial education; and in large manufacturing towns, where the pupils cannot be accommodated under one roof, that branches or district schools be established to meet the wants of the community. After the student has passed through his rudimentary instruction, he should be eligible to enter what I would designate the Industrial College, and should there receive instructions upon the exact sciences, and those branches of chemical research which would teach him first principles, and fit him for the exercise of his profession.

"I do not think any measure of enlargement, or the engrafting of industrial institutions on the existing endowed grammar schools, would answer the purpose. They appear to be founded for totally different objects, and, I much fear, could not amalgamate or be connected so as to work harmoniously with the industrial system. It is different with mechanics' institutes. They appear to me to be the legitimate establishments for such a course of scholastic instruction; and as nearly every village in the manufacturing districts has its mechanics' institute, an industrial school attached to each, under the cognisance and superintendence of a Commission, would become a valuable adjunct, and of immense importance to the advancement of the industrial arts.

These schools, if established on a large scale, should, in my opinion, be as comprehensive as possible, and embrace every description of industrial culture, not exclusively for the mechanical and manufacturing arts, but for every branch of education connected with agriculture, the theory and practice of drawing, subsoiling, and all those principles of chemical and mechanical manipulation which bear upon the management and cultivation of the soil.

It is not my province to point out to the Committee in what way and to what extent these schools should be carried into effect; suffice it to observe, that all pupils intended for managers, foremen, and leaders in different departments of the useful arts, should, as soon as convenient after they have received the requisite preliminary instructions at the school, be transferred to the industrial college, in order,

by a higher course of study, to prepare them for a faithful and correct discharge of their professional duties.

"In each of the large manufacturing towns, such a college should be erected, endowed, and maintained by the State. It should have professors and teachers in the different branches of the useful arts. It should contain workshops and a museum, and should be empowered to give distinctive badges or degrees as rewards of merit. Assuming these schools and institutions to be established, we might reasonably look forward to greatly-extended knowledge and a higher standard of character amongst the mechanics and artisans of the United Kingdom."

[2659.]

From Mr. Richard Fort, of Read Hall, Lancashire.

"I am very much engaged in other matters, and cannot, at the present moment, give the attention to the subject you have submitted to my notice, which its importance and the interest I take in it demands. As far as I can gather, from a hasty glance at Mr. Potter's pamphlet, and at your circular, there seem to be two theories in conflict as to the means of promoting artistic and scientific progress in the arts and manufactures of the country. One theory proposes the *laissez-faire*, or let-alone principle, in its integrity, making their progress depend upon the chances of individual genius and the activity called into play by pure commercial competition; and the other, proposing to adopt the patriarchal scheme of patronage and special education in vogue in continental countries. If this be so, I should much incline myself to advocate a middle course. I think the wants of the age require educational establishments, in great manufacturing centres, devoted to the exclusive teaching of those branches of natural science most intimately connected with the great branches of national industry.

"These sciences are, chemistry in the large sense of the term, and mechanics. The range of chemistry is so immense, and the temptations to a student to spread a thin and flimsy attention over a large surface so great, that unless its teaching divides itself into special departments, and after giving the student his choice of one or at most two, confining his attention rigidly to them, I think there would be no other effect produced in his mind than a vague and desultory thirst for universal knowledge, just incompatible with the concentration required for successful practical application and research.

Suppose, therefore, through Government or voluntary agency, a Physical Science College established in Manchester or Birmingham. I should suggest that the students attending it, after going through such a preliminary course of chemistry as would make them acquainted with its fundamental laws and tolerably dexterous as manipulators, should take up one branch and pursue it exclusively. For this purpose the teachers of the science should adopt divisions having reference to the great divisions of natural industry rather than the strict affinities of purely scientific laws. The Birmingham school

should divide chemistry into the metallurgic and ciramic (or pottery) departments, — should pursue them almost exclusively, and leave chromatic and organic chemistry to be prosecuted elsewhere. The action of the imponderables upon metals, clays, the laws of crystallisation, &c., would be their particular province; and each branch of this province would itself soon become extensive enough to occupy the entire time of teacher and scholar.

"At Manchester the science would divide itself into chromatic chemistry, and some department specially subservient to the purposes of the manufacturing chemist. In London, pharmaceutical, medical, agricultural chemistry, or some such divisions, would form separate faculties.

"Such institutions should be governed by laws of discipline, affording to the student every opportunity of economising his time and money, and placed under a management which should preclude nepotism, and vest powers of removal of teachers for incompetency in some qualified body. Were they established in this spirit, and did they confine themselves in *proper humility* to teaching the *principles* merely, and *scientifically known* facts of the trades they referred to, I cannot conceive any one doubting their conduciveness to improvement. But were they to assume presumptuously the office of *special practical* instructors, instead of *special scientific* instructors, nothing but failure would result.

"The practical man of active empirical habits, his attention confined to a few objects and whetted by cupidity and competition, would produce better work than pedantic universalists. To teach calico printing or sugar refining, I believe utterly impracticable and illusory in any public seminary, — to teach the principles involved in them, useful and practicable.

"Were there a department for mechanics, its teaching should make very sparing excursions to the skies, and keep the student to mother earth. The majority of mechanical inventions have been made by unscientific men, of observant and deductive minds. A week would teach all the mechanical science *generally* necessary to still further scientific improvement. The way to promote it is to *multiply hints;* a mechanic department should be a museum of models, sufficiently large and perfect to rehearse their proper movements. An Arkwright or Crompton let loose amongst them would devise a thousand simplifications that would never occur to his brain if he meditated the laws of gravitation in their complications, to the end of the world. In London such a department, having reference to civil engineering, might aspire higher.

"I have no time to expatiate more, and must conclude with a few words about Design.

"Were such a college established, I conceive it might most usefully teach correct drawing, and the laws of harmony in colours, and of symmetry and proportion in form; but it could not attempt to teach taste and design in any other sense. The former is an act of the judgment, the latter of the inventive powers. Continual energetic action of each is necessary to success; and work for money alone, as we are constituted in this phase of society (which is the commercial one), produce the necessary intensity of attention.

"A long residence in a highly critical society would make the designer too negligent of the actual tastes of the community for commercial purposes. Commercial pursuits have for their end the making of money, and that can only be done by extensive sale; people will not buy what they don't like, whether Raffaelle or Sir Charles Eastlake like it or not. The *taste* of his customers *may* be improved by the manufacturer, but it must be by carrying these experiments a little, and a *little*, in advance of the popular standard, and not by *unprofitable* experiments on a large scale, based upon the assumption of a higher standard than exists.

"I am so hurried that I fear these observations will be of little use. Any way, I am much interested in the solution of a problem which I think of great importance."

[2258.]

From Mr. William Felkin, late Mayor of Nottingham.

"I agree in the fact, as stated in the circular, that education should include industrial knowledge so far as concerns principles, and the mode of working them out in practice; and also storing the mind with important facts; and that our grammar and proprietary schools may well be made accessories to this end. The time has arrived for improvement in these institutions. I believe that in many of them additions are making to the course of instruction, with the view of making them more useful. Nevertheless I would not desire them less grammatical or less mathematical. This primary discipline is of great service in after life, let it be as manufacturing or commercial as it may.

"Here permit me to express my dissent from the view of your Committee. "The great want of our time" I believe to be — a disposition on the part of our industrial population to obtain instruction. This does not exist at present. I lay no blame anywhere — perhaps it belongs to us all. But, were the best scheme of instruction that ever was devised now carried into effect, so far as to secure masters and all other preparatives, yet it would be wise not to look for — say immediate results, on a large scale. If left to the voluntary operation of the parents, the process of bringing up the mind of the working people of this country to a higher standard, will be a very slow one for some time to come.

"They have large pecuniary means at their command, only requiring self-denial as to appropriation; and a fair amount of scholastic knowledge obtainable at their doors — in the town where I write — at a cheap rate, and yet the schools are not filled, nor children educated as they might be.

"Our People's College is a case in point — admirable, unsectarian tuition — languishing for want of scholars; it offers excessive cheapness as to its charges; and that amidst a high rate of wages. Few out of a population of 100,000 attend, though it is not ineligibly located.

"The Committee will not misunderstand, I hope, the drift of these

remarks. I do not deprecate the effort to improve our schools; it must be made.

"Primary schools should be elevated. In the subsequent course of education, there should be an adaptation of instruction to subsequent employment.

"If mechanics' institutes can be made industrial colleges, much will be gained as to the means of real usefulness. In regard to them, my convictions have been so strong on this head, that when the late President of the Nottingham Mechanics' Institution requested my thoughts, some years ago, as to the nature of the trust-deed, embodying the objects of the institution, and the plans to secure them, I handed him a scheme, in which were included Nos. 5, 6, 7, and 8, of the suggestions of your circular almost in so many words. Without some such arrangements for progress in study, to be tested by strict public examinations of the highest kind, and these to be followed up by exhibitions to an industrial university, certificates, &c., I do not expect much from mechanics' institutions.

"These views are stated in the reply I had the honour to send to the Royal Commissioners as to the distribution of the Exhibition surplus.

"May I be permitted, while expressing entire agreement with the Committee, that our institutions should be self-supporting, to point out that there is some ambiguity in the term "self governed." Does this intend, that, as in our mechanics' institutions, a simple majority of the subscribing parties, in other words of *the pupils themselves*, is to be the governing body through a Committee that may by them be annually appointed? If so, they will prove failures. This defect in their actual organisation is the reason of much of the present inefficiency of mechanics' institutions.

"The great difficulty of the case is this. Our working population received, say last year, 150 millions sterling in wages; and spent 30 millions of it in drink and other ways, apart from home, family, or domestic requirements altogether. How can a fair proportion of that or any other sum be got, with the good will of those who earn it, to be appropriated to the education of their children? What institutions will present to these parents, or to those who feel their own need of instruction, the most satisfactory inducements to set apart the time and money necessary to take advantage of them? Will the State compel the people to pass through an educational training, and pay for it? I do not see how it can do so. If not, how are voluntarily conducted institutions to be governed so as to be really useful? I submit they cannot from within, except with very slowly realised results.

"I think all schools for the children of the working classes, as such, are to be avoided. The parents could not take the management; the employers must not, or they would soon die away from the jealousy of the men. Indeed, class-schools or management is neither necessary nor desirable.

"It does not seem absolutely impossible to set up local scholastic institutions open to all, on very moderate terms of charge, perfectly unsectarian, insuring to real students satisfactory progress in literature, science, and art, and having moreover a special direction where

desired; offering certificates of merit, and exhibitions to colleges; the whole to be placed under a competent local management. This local management to be specifically authorised, having been called into being by an act of parliament; to be public in the appointment of its examinations, in the allocation of its certificates and prizes, &c., its accounts, and indeed in all its responsibilities.

"I believe something of this kind must come in due time; and when such a scheme shall have been successfully in operation but for even a short time, it will absorb our so-called mechanics' institutions, schools of design, local galleries of art, and other institutions, now doing much less good than if their energies, funds, and pupils were concentrated under one competent and truly responsible management."

[2154.]

Mr. R. W. Fox, F.R.S., &c., of Falmouth, writes:—

"An *industrial education*, in its full sense, would indeed be a great boon to the people; the habit of steady, persevering, and methodical application to the business in hand, is what is needed, and if any plan can be devised to promote this object, and to encourage greater *concentration* of mind, the rising generation will indeed be benefited.

"It seems important also that young persons should not be lost sight of *after* they leave school, and enter into their various employments. Often they go to work very early in life; and some more ample provision for evening schools, in which their right education may go on, is greatly needed.

"I know from experience that children may be induced, at an *early age*, to put *small* sums into the savings bank, and that when this habit is formed it continues after they grow up; this I offer as a suggestion. Another I will venture to make, is, that humanity to the animal creation should be enforced more than it is in schools. But books on the subject should be generally introduced, and sometimes read to the children, and commented on by the teachers.

"It appears to me that such instruction may have a beneficial influence on their future characters, and have a tendency to cherish not only humane feeling, but kindness and benevolence towards their fellow-creatures."

G.

[2714.]

Mr. W. Gourlie, of Glasgow, writes to the Committee:—

"I have had frequent opportunities of coming in contact with artisans (such as engineers, mill-wrights, calico-printers, &c.), whilst

engaged at their work, and am convinced that it is a very great advantage to them if they have, in addition to a practical acquaintance with their art, a knowledge of the principles of mechanics, chemistry, or other sciences connected with their business.

"The industrial schools or colleges for the instruction of workmen in the theory as well as the practice of their various trades would, I think, be extremely useful; and if the terms of instruction be kept low, I have no doubt the opportunity of getting such information would be eagerly embraced.

"In these days of keen competition, both as regards quality and cheapness of manufactures, it is necessary that the artisan should have something more than mere 'rule of thumb' to guide him in producing superior workmanship.

"I got the Andersonian Museum opened to the working classes on Saturday evenings at 1*d.* each, in November last; and since then about 11,000 people have visited it. A small committee of naturalists attend, and give explanations; and the museum has been much improved by cleaning, labelling, &c.

"The Botanic Garden was also opened last summer, on Saturday evenings, at 1*d.* each; and the attendance was large."

[2134.]

From the Rev. J. W. Innman, Head Master of the Grammar School, Grantham.

"No doubt these Institutions may be made more useful than they are to the people; but you must take care not to attempt too great a change in them. The principal object of their foundation was to extend the knowledge of those languages in which Holy Scripture was written, as the simplest and best means of remedying and preventing perversions of religious truth; notwithstanding it is quite true, that the greater part of the boys educated in them never attain to a competent knowledge of Greek and Latin; and that the public in general evince a greater appreciation of those parts of education, which are calculated to promote the material interests of their life.

"The utmost, therefore, you can do with them, or induce Parliament to do with them, is this — you may amplify that part of the instruction which is acceptable to the public. If you attempt to touch the main object of these foundations, your whole scheme will fail.

"You may modify their constitution in this way. You may make two divisions of a school, one classical and mathematical, answering to the gymnasium of the Germans; the other English and commercial, with some instruction in Latin, resembling the Real Schools of Germany. You may add French, German, and drawing masters; and, as a return for their advantages, you may exact some payment from the boys. The systems, however, should be generally compulsory, and the payment also. Geometry and algebra are already taught in these schools. Other sciences might of course be added, if the boys would stay long enough to learn them.

" Prizes, exhibitions, and scholarships *in the school* would of course assist in detaining promising boys at school.

" With regard to those sciences which are more remote from the usual education of boys, and bear more immediately on any particular art, I, in the first place, very much doubt whether they ought not to be deferred to a period beyond boyhood; and I feel sure they ought to be taught in a separate place of instruction. The best way of bringing them before the public will be, in my opinion, by founding lectureships in the different public halls, scientific and mechanics' institutes, which exist in our towns; and establishing prizes and distinctions to encourage students. These lecturers might be permitted to charge moderate fees for their lectures. The prizes, &c., should be conferred by general Government examiners.

" Have, however, a good care you do not reduce the marketable value of any particular art. Think of the poverty of the German student and the French professor, and do not multiply artists beyond the natural demand. Parents already hesitate to submit their children to the labours of an university education, because the advantages and profits of learning have already begun to fall below their proper rank."

[2562.]

From the Rev. Horace F. Gray, Prebendary of Wells, and Vicar of Pilton, Somerset.

" Sir, — I have given my best attention to the statements contained in your Circular, and entirely acquiesce in the object you have in view, which I understand to be, bringing to bear upon education all the modern improvements and advances in science and art, in order to enable our youth to enter with greater advantage on the several walks of active life.

" Taking this leading principle as our guide, we find within the sphere to which your Society addresses itself, of ' Arts, Manufactures, and Commerce,' many branches of study which were all but unknown and unattempted when the outline of instruction as appointed for the Grammar Schools was drawn. We may specify chemistry, dynamics (including steam), physical geography, political economy, &c.: the list might very easily be lengthened. But, without going further, it is manifest, that of these the principles are so clearly and finally established, that they may become a portion of education; and, indeed, must be so, if the next generation is to advance on the discoveries of the present.

" I am one of those who have long believed national education to be the ' great question;' who feel that the time has now happily arrived for the propounding of a noble and adequate plan for that great work, and for drawing out, in connexion with such a proposition, a a new outline of instruction, in relation to the special wants of the rising generation and the present state of knowledge.

" I gather from your Circular, that similar impressions are entertained by the members of your Society; and I cannot doubt, but that thoughtful persons throughout the community are coming more and more to the same convictions."

[2887.]

From Mr. Harry Green, Artist, of Stoke upon Trent.

"I beg to acknowledge the receipt of your letter with much pleasure, as it affords me an opportunity of expressing the confidence I feel, as to the realisation of the happy results anticipated from the establishment of a universal system of industrial instruction, in the *principles* of those arts and sciences in which we are daily becoming more deeply interested.

"Too much support, therefore, on the part of manufacturers and the public generally, cannot be given to the members of the Industrial Instruction Committee, and the Council of the Society of Arts, in their praiseworthy endeavours to accomplish so desirable a scheme.

"I regard the recent establishment of elementary drawing schools as one important step in the right direction; and independently of being instrumental in diffusing a correct taste, will be highly beneficial in rendering more effective the labours of those who have the direction of our schools of designs, and other schools of a similar character, which may be hereafter established. Art, however, and the practical sciences, seem to be so inseparable in their relation to manufacture, that the successful development of industrial art, without a knowledge of the *elementary principles* of those sciences, on which its successful application to manufacture depends, seems to be an impossibility.

"I am of opinion, that the system of instruction adopted by the department of practical art already contains many features applicable to the foundation of a very efficient system of industrial education; and that by an extension of the system, so as to provide facilities for imparting sound elementary instruction in the principles of the chemical and physical sciences, *simultaneously* with the elementary instruction in the principles of industrial art, much that is wanting may be supplied.

"With respect to the suggestions offered in your letter, as to the enlargement and improvement of some of our endowed grammar schools, and the conversion of the existing mechanics' institutions, where practicable, into industrial schools for artisans; I am of opinion that such arrangements would be very desirable, and would render them of greater value to the industrial community than they are now.

"The establishment of a class of schools in which the courses of instruction would be of a more extended character than those prescribed for the more strictly elementary schools, would be especially desirable as affording to artisans who have passed through the elementary courses honourably, opportunities of qualifying themselves for pursuits of a high character, as foremen, or superintendents of works, &c., or as teachers in the elementary schools.

I also believe that *aid* would be necessary, in the first instance at least, as a means of carrying out the scheme, until the public shall have become so impressed with the value of the schools, as to feel that they have a claim on its support. At the same time I have little doubt, that if a system of industrial education such as is contemplated by the Committee were introduced, it would be so highly

appreciated by those for whose benefit it is intended, that many schools would soon become self-supporting.

"That the courses of study recommended should be as systematic and definite as possible, I believe to be indispensable; both to avoid the unsatisfactory consequences of desultory study, and to prevent confusion in carrying out the plan.

"I am also of opinion, that the provision of exhibitions or scholarships would be highly beneficial as a means of enabling advanced students from the elementary classes to attend the schools of a higher grade, and qualify themselves for pursuits requiring a higher degree of instruction than those of an ordinary workman; and that the award of prizes, in the shape of instruction books, instruments, &c., would be commendable both as a means of instruction and encouragement.

"Expressing my entire concurrence in the sentiments of your letter,

"I am, &c."

[2586.]

Messrs. Greenhalgh & Sons, of Mansfield, Notts, write:—

"In allusion to your Circular received this morning, we conceive there can be no doubt that a scholastic training for youths intended for the useful arts, would be essentially beneficial if it embraced a knowledge of the elements of science and of the qualities of natural productions.

"Our branch of the cotton manufacture, doubling fine yarns, is intermediate, being between the spinner and the manufacturer of the various fabrics in which cotton is employed; mechanical and general knowledge of course are necessary in conducting our business."

[2284.]

From W. R. Grove, M. A., F.R. S., &c., Hare Court, Temple.

"Taking great interest in the subject of educational reform, I should have been most happy to have offered such suggestions as occurred to my mind. But, within the time you name, or indeed, for several weeks beyond it, I have now no hope of finding leisure to enter upon the subject in any detail; I can, therefore, only give shortly one or two first impressions.

"With many of the objects suggested, few of those interested in the improvement of industrial education would dissent. But the difficulties which have hitherto obstructed those who have worked for similar objects, have been connected with the machinery by which they are to be executed.

"I do not find in your letter any definite plan proposed on this

head: probably it is contemplated to submit some plan to consideration at a later stage of the proceedings of the Committee.

"Although self-support and self-government will be amply sufficient for the effectual management of any single institution, the voluntary principle has been always an impediment to unity of action, which last element, I fully agree with the Committee, is an essential.

"If, for instance, several mechanics' institutions or schools consent to adapt their modes of education to that proposed by a central college, such assent may at any time be revoked, and probably would be, on the least disagreement. Unless, therefore, some plan be developed, which would result in an Act of Parliament for the regulation of such central college and its affiliated institutions, I fear any voluntary combination would not be of any long duration.

"I so far agree to the voluntary principle that I would not have the educational institutions dependent upon Government for continuing emolument, or for the appointment of officers, but without statutory control I see no means of insuring stability and permanence.

"The first suggestion in your letter in contra-distinguishing the schools unconnected from those connected with Universities, seems to regard it as undesirable, or as hopeless, to infuse into the latter a style of education which should instil 'the principles of the sciences on which arts and trades are founded.'

"Doubtless the character of a purely industrial education and that of one directed to the instruction of those who are not connected, either as masters or artizans, with any handicraft employment, must ever be very different; but the bearing of one upon the other of these classes of education is much more intimate than is generally supposed; the instruction in the minor schools of a country has always taken, and will probably to a great extent take, its tone and character from the Universities.

"If the middle classes were fully conscious how deeply they are interested in the cause of University reform, and if those who are anxious and active in promoting industrial education would lend their aid in the promotion of such reform, the effect of success in the latter object would inevitably re-act on the former.

"If, for instance, the University of Oxford was to throw open its fellowships, and introduce a plan of education more consistent with the present state of knowledge, and better adapted to the wants of society in the present day, great effect would be given to plans of industrial education. The sympathies of the higher would be brought more into unison with the middle and lower classes, while the lower classes would have greater opportunities and stimuli to exertion, if ability and good conduct in an early period of life offered passports to distinction and improved social position. Unity, instead of antagonism, of thought and action would result.

"It does not appear from your letter, whether the scheme proposed by the Committee is connected with, or is a part of, that proposed by the Exhibition Commissioners in their second report. It is important that it should be generally known whether they are united or separate plans. It appears to me most desirable that, in any great movement for educational reform, there should be one plan, uniting the wishes

of the great majority of those interested in the subject, and also embracing in it, as far as can be, existing institutions. In this country, from the very freedom of action enjoyed, great and comprehensive works are generally impeded by the separate and frequently opposing actions of those interested in similar objects and holding similar views.

"A little reform of existing institutions is more stable and durable than a great change, which, beneficial in itself, becomes an obstacle from its antagonism to cherished associations and interests, which, from the long period of their continuance, have taken deep root. I am glad to see the Committee have, to some extent, borne this in view in their second and third propositions.

"On reading the last five propositions of the Committee, the question immediately arises, who are the persons, or what is the body, to find the models and the apparatus, to found the exhibitions and scholarships, to elect the examiners, &c.?

"I presume, from the institutions being proposed as self-supporting, these are to be produced by funds subscribed by parents and others interested; but the mode in which the governing body is to be elected and perpetuated is not suggested.

"Those who are honoured by your Circular can hardly make a suggestion on this head until they have before them the views of the Committee.

"I regret being obliged to write hastily on so important a subject, but your desire of dispatch and my present occupations leave me no alternative."

H.

[2675.]

Mr. Alexander Harvey, of Govanhaugh, Glasgow, writes:—

"As Mr. Solly's letter [the first circular] embodies almost entirely my views of the above subject, I will merely make a few remarks on the six different suggestions thrown out by the Committee, so far as they are applicable to Glasgow.

"I. I entirely approve of the elements of industrial instruction being introduced into all elementary and grammar schools, whether endowed or not. In connection with this I may be allowed to mention that, some years ago, Mr. D'Orsay, teacher of the English department in the High School, Glasgow, did much good by the introduction of books descriptive of trades, arts, and manufactures, as text books for his different classes.

"II. Some system differing from the one at present pursued in our mechanics' institutions will require to be introduced, to induce the class for which they were originally intended to take a greater interest them. These institutions (as their name implies) were intended almost entirely for the working classes by their founder,

Professor Anderson; but I am sorry to say, that, for several years back, the mechanics have formed but a small portion of the number of students attending the various classes, seldom averaging six, or eight, either at the Andersonian or mechanics' institution; while the greater number of students are either schoolboys, or young men from shops and warehouses. Perhaps a more practical and less elementary system of instruction might induce mechanics and artisans to take a greater interest in such classes.

"III. Such schools as are referred to in this section have long been in existence among our continental neighbours, and have, I believe, been instrumental in imparting that good taste, for which the French manufactures are so justly celebrated. I should rejoice to see such schools instituted in this country.

"IV. Books, maps, and models, diagrams and apparatus, at whatever cost, ought to be used in all schools, as they in all cases afford greater facilities to imparting instruction.

"V. Systematic and defined courses of study ought to be recommended; as also that the elementary classes in the same course of study should be separated from those farther advanced in knowledge of the particular object of study.

"VI. With this section I entirely agree. With these brief remarks I have only further to express my hope, that the efforts now making to form our schools more *efficient*, and better adapted to the wants of the country, may be successful."

[2976.]

From Arthur Henfrey, F.R.S., &c.

"I beg to offer a few observations, the results of much reflection, on the subject to which your letter directs attention.

"In the first place, on reference to the suggestions, I. and III., it is evidently desirable that the school instruction of all classes should be better adapted to the existing stage of mental development, for the sake both of present good and future prospects. As regards the introduction of science and art, it is my impression that the most beneficial course would be one that is also simple and practicable. It must be clear to all who have thought upon the matter, that abstract study should only be included in small degree, and very gradually in the education of the young, since the faculties are not ripe for it, while that age is peculiarly the one in which it is most important to develop the powers of observation and discrimination, and to lay the foundation of discipline, a method which is so essential in the subsequent activity of the individual mind. In school education, therefore, while we retain so much of classical instruction as accords with the position in life of the scholar, and pay more attention than at present to modern languages, it appears desirable to lay much greater weight, than is usual in the higher schools, on arithmetic and the lower branches of algebra and geometry, as they form the best means of training the reasoning faculty; their simple

data fitting them peculiarly to the immature condition of the intellect.

"At the same time, and as a new feature of this stage of education, I believe that very great benefit would arise from the regular pursuit of those branches of natural history which deal with the discrimination and description of forms, viz., the systematic parts of zoology, botany, and mineralogy (exclusive of the philosophical principles), which should be taught practically by means of demonstrations on the part of the teacher, and exercises in discrimination and description on the part of the scholar, by the aid of collections, and, where local circumstances permit, in the field. The advantages of such studies in inducing the knowledge of external objects, training the observing faculties, and producing habits of exactness in the examination of things, and in the use of language to express ideas, can hardly be overrated. Geography should be cultivated at the same time with the aid, not merely of abstract treatises and maps, but also of authentic narrations of travel in the more distinctly characterised regions.

"The taste and technical capacities for art should be cultivated also in schools on a firmer and more regular basis than is usual at present, not as furnishing extraneous accomplishments, but as integral parts of a system for developing the natural powers. Here, again, special practice is the part fitting for the young, guided by a knowledge of principles prompted by the teacher, but not attempted to be instilled into the pupil until he has acquired a store of personal experience which will enable him to fill out and illustrate the abstract principles.

"Instruction of this kind would prepare a youth to continue his education after leaving school, not regarding it as completed, as is pretty generally the case, unless he is destined for a special profession, and it would bring him into a position to pursue it with great advantage.

"The next point to which I wish to direct attention is one which I approach with some diffidence, as it involves an exposition of views which may be thought overstrained, but which nevertheless appear to me only a natural continuation of the system, and an extended development of the principle advocated above, and which moreover, I am firmly convinced, are in accordance both with the abstract theory of the intellectual powers, and with the practical requirements of the time.

"The progress of science during the last fifty years has altogether changed the face of the external world, as contemplated by a thoroughly educated man; and it is essential that men who are to become useful citizens should have their minds unfolded in such a manner, that they can look upon the phenomena of modern civilization with an intelligence instructed for that purpose, and not disabled by the prejudices and ignorance which must result from observing these phenomena from the standing points of earlier stages of mental culture. The expansion and interconnection of the various physical sciences is the marked feature of modern progress, consequently an acquaintance with the nature and objects at least of these sciences is indispensable in a liberal education at the present day. In relation to this subject, and especially in reference to the suggestion H.

and V. of your communication, I have to submit the following scheme: —

"The experience of the management of popular scientific institutions, and observation of daily life, tell us that what is *consciously* required by the people at large is *general knowledge*, and that it is not the business of public institutions to provide for *special* instruction as a general rule, but only to prepare the mind by some general system to seek its own speciality in the way most beneficial to the individual and the public. I am of opinon that existing mechanics' institutes, and analogous establishments, should be replaced by colleges, where the population is able and willing to support them, in a great manner on a self-sustaining basis. These colleges would be destined peculiarly for the instruction, in general principles of science and art, of young men between the ages of fifteen and twenty, or from the time of leaving school to that period when they become more particularly personally responsible and active in the business of life. The benefit of the institutions must, however, be accessible to all who wish to avail themselves of them.

"I have assumed, that what the great body of society requires is, a knowledge of general principles; and that special scientific or æsthetic knowledge will only be cultivated by professional men, or by a certain number of amateurs. It is further clear, that the public at large want only *ascertained principles*, taught, of course, with the understanding of the progressive nature of all knowledge. Now there appears to me no reason why instruction should not be so treated as to be capable of teaching the principles of all the important branches of physical science, and also of those capable of maintaining the principles of the fine and useful arts. Let their teachers be educated in the central universities, where they should be examined thoroughly, and graduate to a certain step in each branch, with the view of lecturing on principles in these municipal colleges. These teachers might, and indeed should, have also their special practical study, since this is most important as a mental safeguard, and they might find their appointments in districts where their speciality would be of advantage, as chemists in manufacturing towns, geologists in mining districts, physiologists in large cities, &c.; but with the understanding that they kept up the knowledge of principles to the day, as the main object of their vocation.

"With regard to instruction in Art, my experience is insufficient to enable me to arrive at convictions, but I shall offer some suggestions as to the course of instruction in the sequel.

"I have proposed the establishment of municipal colleges, by the conversion of mechanics' institutes, &c., and it is necessary to explain what is intended under this title.

"In each case there would be required a building containing a lecture theatre, adapted to the population of the locality; a collection of philosophical apparatus, and diagrams of objects of natural history, illustrative drawings, and a collection of works of art; all these objects being selected on a system of illustration by *types*, and arranged on philosophical principles. To these should be added a library and reading rooms if possible, and laboratories and studios might be conjoined in cases where it was advantageous.

" One instructor in science, and one instructor in art, would suffice; in large towns it would be a matter for the consideration of the local authorities, or the inhabitants at large, whether to have more instructors in one college, or more than one college; the latter alternative would appear preferable.

" The nature of the instruction I have to propose would be as follows, the scheme being drawn up with careful reference to the wants and powers of the pupils, and the demands which may be made on the instructors.

"The scientific instruction to be offered to a youth who had received a school education on the plans recommended in the earlier part of this letter, should extend over four years, in a system of progressive, though gradually increasing, complexity. The students should be, of course, urged to carry out detail simultaneously by self-instruction, for which no substitute can exist.

" In each year the student should attend twenty-four lectures on science, delivered at intervals of a fortnight, and the following courses are suggested as approaching to a suitable scheme: —

1st Year, —

Physics	Astronomy	6	24.
	Properties of Matter and Form	6	
	Heat	3	
	Light	3	
	Electricity	6	

2nd Year, —

Chemistry	Crystallography, Chemical Affinities, Atomic Things &c.	6	24.
	Mineral Chemistry	12	
	Organic Chemistry	3	
	Chemistry of Life	3	

3rd Year, —

Morphology	Vegetable	6	24.
	Animal	9	
Physiology	Vegetable	3	
	Animal	6	

4th Year	Physical Geography	12	24.
	Geology	12	

" For the teaching of Art I hesitate to offer a positive scheme, but submit a sketch as indicating the principles in which the course should be arranged. There should be twenty-four lectures per annum, as in science, taking the alternate weeks, and extending in like manner over four years.

1st Year, —

Elementary Art	Form and Proportion	6	24.
	Colour	6	
	Perspective and Composition	12	

2nd Year, —

Constructive Art	Engineering, General Construction, Machinery	24.

3rd Year, —

Manufacturing Art	History and present Condition of Pottery and Glass Metals Miscellaneous chemical Manufactures Dying, Printing, &c. &c.	24.

4th Year, —

Fine Art	History and present State of Fine Arts and Principles of Taste Sculpture Painting Architecture	24.

"According to this scheme, each pupil would attend one lecture each week, and each instructor would deliver two lectures each week, when the four years' courses were in full action.

"The demand on the time of young men engaged in business would not be too great in the above scheme, and such an appropriation of part of their leisure would undoubtedly be of the highest moral, as well as intellectual benefit to themselves and to society. The advantages of such instruction over the chance medleys now offered by popular institutions, require no enforcement, while the plan offers a possibility of supporting a class of thoroughly educated men, engaged in instructing their fellow-citizens, one of the chief desiderata of the time.

"The question of the practicability of the above plan lies above all in the means of supporting the institutions with the necessary funds. The first step would be the most difficult. The establishment of these institutions in an effective manner would require the expenditure of much money, and it would be requisite to be provided with the means of tiding over the few years which would elapse before adequate popular support was secured. But what has already been done in this direction by private individuals and public bodies promises fairly. It seems to me, that the buildings should be provided and kept up by the municipal bodies; and government aid would be well directed in providing the objects for the museums, &c., from a central establishment. The two instructors in each college must receive each a salary of not less than 250*l.* per annum, and it seems reasonable to suppose that 500*l.* per annum would soon be received in annual subscriptions of 1*l.* for the forty-eight lectures in those towns which really required such an establishment. It may, indeed, be a question, whether the support by Government of a certain number of such instructors, in institutions provided by local funds, as initiatory of the system, would not be a great public benefit; but I have little doubt that the colleges would become self-supporting when once the public mind had become fully alive to their utility.

"It will be seen that my propositions are directed merely to general education; and I believe that this is the object which demands public care. Special instruction will be found, by those interested in possessing it, in the manner most consonant with commercial interests. The education of an enlightened body of citizens is a matter of national interest.

"Such a course of training as I have suggested, might be advantageously pursued by young men of all ranks, simultaneously with their training for trades, professions, or the avocations of private life, and ought to be regarded as essential to the completion of a liberal education, not of course under the supposition, that every man will become an avowed cultivator of Science or Art, but because every man ought to know something of their nature and objects."

[2133.]

From Mr. John Hick, of the Soho Iron Works, Bolton.

"I quite approve of the object you have in view, and of your suggestions as to the means for its attainment. One immediate advantage, in addition to those you have alluded to, would, I think, result from the system of education now proposed, viz. that a young man desirous of entering any business would have the opportunity of directing his studies and abilities to the branches of art and science more particularly bearing upon his intended occupation; thus developing his suitableness for such employment (or otherwise) before becoming committed to follow it. I have experienced much disappointment in this respect—not only on my own account, but on that of young men who have been almost forced upon me, without any regard to the talent they possessed for mechanical pursuits; but who, having once embarked in them, do not like the odium of withdrawing. I think it would tend greatly to the success of any institution, if a measure can be carried out for these purposes, on such a scale as to admit of there being different teachers of various branches of instruction whose lectures or classes the pupils could have the opportunity of attending, as is pursued in our colleges; and it is very desirable that the courses and modes of instruction should be well established, and defined, or laid down, at a normal or central institution in London, to which the different schools can refer, and from which they may procure instructors in the various branches of education desired to be inculcated. The advantages of the division of labour are as palpable in reference to education as to any science or employment. I consider it also indispensable that the pupils shall be required to contribute to the expense of the instruction thus to be conveyed, all experience proving that small exertion will be used to secure the continuance of that which is purely gratuitous. I am so situated, that I fear I could not take any very active part in advancing this system of education; but I shall be glad to bring it forward, as far as I am able, in connection with a new educational institution which we are now establishing in Bolton."

[2551.]

Messrs. Hill, Evans, & Co., of Worcester, write:—

"In reply to your Circular we quite feel the importance of efficient assistance being rendered to the development of industrial education

of the character alluded to, and see no better mode of rendering that assistance than in the manner indicated in your Circular.

"At the same time it appears to us that the success of any attempt of the kind will mainly depend on the unanimity and hearty cordiality of the mass of the manufacturers and working-classes; and that great care will be requisite to devise a plan of operation that will not infringe, in any way, on the moral or religious tenets of the people. For this purpose we see no chance of success but by keeping the proposed school entirely distinct from and free from the control of any of the religious sectaries, whether connected with the Established Church or the various bodies of nonconformists. To carry out this caution, it will be very difficult to associate with the *Grammar Schools*, which, as far as we know, are all connected with the Established Church, and require compliance with its usages in all who are pupils.

"In any *local* effort for this city, we should be happy to render our best co-operation."

[1904.]

From Leonard Horner, F.R.S., &c.

"My attention has been for many years earnestly directed to the subject of the education of the humbler and operative classes. And, if I had time to set down all I could say on the subject, I should have to fill many sheets of paper such as this. I will, however, briefly state my views on the very important subject of the Circular.

"The object I conceive to be the *professional* education of our artisans; that is, in so far as that is independent of what is learned in the exercise of their several callings. To be of practical use, it must be instruction of that accurate kind which will enable them to apply practically what they have learned.

"The instruction must be different, according to the nature of the employment; and therefore a preliminary step must be, to ascertain what are the branches of education that will be in demand. To do this, I would have made out a list of the different trades, and against each I would place the branches which ought to be taught to the person engaged in it, so as to enable him to understand the principles of the operations in which he is daily employed, and also to increase the chance of improvement and invention in it.

"I assume that the persons to be taught have had a reasonably good school education—a great assumption, I fear, from what I know of the schools for that class of the population.

"Such a classified list would show the kind of instruction to be provided in each particular locality. Most likely chemistry and mechanical philosophy would be found by far the most general in demand. I mean the general principles; and, to teach the latter, mathematics would be indispensable. To give a young man such a hold of these, that he could apply the principles in practice, would require a pretty long course of systematic instruction, both by lectures, by books, and by examinations.

"Next to chemistry and mechanical philosophy, drawing would probably be most in demand; in two branches, mechanical, and as applicable to arts, in which ornament and taste enter.

"There is scarcely a town of any consequence in which the above branches would not be in demand.

"There would then come the application of the principles to various trades, and that opens up a very varied and extensive range of teaching, which would be different in different localities.

"In framing the system of instruction, it must ever be borne in mind how very small an amount of time a young artisan has at his command for education out of his workshop.

"In most trades he must begin work at six in the morning, and continue till six in the evening—often later. After leaving work, he must go home to clean himself—perhaps change his working-dress, and get some food; so that, under the most favourable circumstances, he will not be free before seven. As he ought to be in bed at ten, to enable him to be up between five and six, if you deduct the time for going and returning from the place of his instruction and occasional recreations, I do not think that you can calculate that even a diligent student would have, on an average, more than two hours a day for lectures and preparatory reading. What he is to be set to do must be regulated accordingly, if he is to do any good; and the concentration of his attention for a time must be rigorously insisted upon.

"It is obvious that the instruction must be brought to the homes of the pupils, and therefore many schools of this kind all over the country would be requisite.

"Then comes the great question of expense. The fees for instruction must be kept very moderate, to bring it within the reach of the young artisan; and it is not at all probable that they would yield a sufficient sum, to give such a remuneration to teachers as would command the services of competent men, and provide current expenses, supposing the first outlay of building, furniture, and apparatus, and books, to have been provided by liberal subscriptions. Voluntary zeal does much, in such places as Leeds, Birmingham, and Manchester; but I fear it would be found very insufficient in the far greater number of places. I do not think that what is wanted can be accomplished, without a very large annual outlay to be provided either by government grants or by local rates.

"Another most important subject for consideration is, the management of such schools. Unless educated persons have the chief control, errors are sure to be committed.

"I believe that the failure of many mechanics' institutes is to be ascribed to the direction of them being in the hands of the young men themselves, who have not experience enough in such matters to take a right course. Very often, too, the forward, talking fellows, with "the gift of the gab," get the upper hand, and the quiet sensible members withdraw.

"Some central body to collect and diffuse information to the local boards of management, would be very necessary. We have seen the advantage in this respect of the Committee of Council on Education.

"These are some of the general views much thought and some experience have taught me to entertain; and if they are in any degree serviceable to your Committee, I shall be very glad."

I, J.

[2044.]

The Rev. Thomas Jackson, D.D., Rector of Stoke Newington, writes:—

"The important subject to which you have directed my attention is one in which I have felt deeply interested during many years.

"In order to understand it, I have personally visited most of the schools of arts, commerce, and manufactures on the Continent, especially those of Lyons, Paris, Leipsic, and Brussels.

"I rejoice to perceive that the introduction of industrial pursuits into every course of elementary education cannot long be postponed; that the study of language, as an instrument of mental training, is not for the future to absorb all the time and attention of youth at school and college, but that some well considered plans will be set on foot to make them acquainted with the products of our own and other nations, with the practical view of improving both the materials on which our manufacturing population is occupied, and the taste which they are now more than ever required to manifest in every department of industry.

"In the promotion of such plans, I shall deem it a high honour and privilege to co-operate."

From James F. W. Johnston, M.A., F.R.S., Professor of Mineralogy in the University of Durham.

"I am favoured with your note of the 25th ultimo, in which you inform me that the Industrial Instruction Committee of the Council of the Society of Arts, of which you are chairman and reporter, intend in their report to refer to agricultural instruction; and do me the honour to request my views at length on the subject. In desiring to meet your wishes, I labour under the disadvantage of knowing very little of the intentions of your Society in reference to this important department of national economy. I shall therefore briefly state to you what my own views are in regard to agricultural instruction, having in view the special condition of English agriculture, and the wants, feelings, and habits of our rural population.

"1stly. Beginning with our lowest grade of schools and scholars, the present condition of agricultural knowledge requires that elementary instruction in the *principles* of agriculture should now be given in all the primary schools in the rural districts. I do not think instruction in *practice* so necessary, and it is by no means so easily or economically attainable. It requires a piece of land, and a kind of practical knowledge in the schoolmaster, as well as habits of business, which are not often to be met with in that class of men, conjoined

with the other necessary qualifications. But to teach the *principles* of agriculture is a wholly intellectual task. It is readily incorporated, therefore, with the usual branches of elementary instruction ; and, as it requires but little time, will demand only an inconsiderable alteration in the existing routine of country schools. I have long been satisfied, from actual experience, that two or three half hours a week during a single year of the boys' attendance at school would make them completely master of all they require to learn in order that they may fully understand the principles of the art by which nearly all the frequenters of our country schools expect in after life to gain their living. That you may be able to form a correctness of this persuasion, I send you a copy of my "*Catechism of Agricultural Chemistry and Geology,*" in which all the known principles of scientific agriculture are briefly stated, which boys of seven years of age are competent to understand*, and which very ordinary industry will enable a boy to master within the time I have mentioned.

"2ndly. This implies, of course, that in our training schools for schoolmasters part of the instruction should be, how to teach these principles. If the above Catechism, for example, is to be taken as the text book for the children, then the rising master should be trained to teach it. This, also, is a work of a short time only to a young person of ordinary intelligence. There should, however, at the same time, be placed in his hands a copy of a larger work, in which the principles he is to teach are in some degree illustrated, and from which he can draw facts and practical observations not contained in the Catechism. With this help he will be able to make the lessons of their text book both more useful and more interesting to his pupils.

"3rdly. In the higher schools, which are situated in the higher districts, and to which the sons of the better class of farmers generally repair, I think a fuller measure of the same kind of instruction should be given, as a matter of course, to all. The Catechism may form here, as in the lower schools, the first book of agricultural instruction ; and in such a school it would soon be mastered. But to this should succeed a second book, more full than the Catechism, and enriched besides with practical illustrations, which will make the pupil regard with interest all farming operations not wholly mechanical. Such a book you have in my '*Elements of Agricultural Chemistry and Geology,*' which I mention because it was written for purposes of instruction, and because there is no other book in the language which will illustrate the kind of instruction such schools in my opinion are fitted to impart, might easily impart, and in the present state of agriculture and of public feeling should be stimulated and encouraged to impart.

"4thly. And while the schools are to be made the vehicle of this important knowledge to the labourer's children, and to the sons of the tenantry, the universities ought to provide similar instruction for those who study within their walls. If the labourer's child can so easily master the principles of agriculture, it cannot take long for the grown-

* Lest you should doubt this, I may mention that, at a public examination of a class of twelve, held in the city of Durham, a boy of seven gained the second prize, the other boys being from eleven to sixteen.

up, intellectually disciplined collegian to become possessed of the same. And who so likely to aid in advancing agriculture as the owners of the soil, or the incumbent of the parish living, both of whom the tenantry are prepared to respect, and to whom a thousand opportunities will present themselves for conveying advice upon rural matters if they have prepared themselves for doing so by securing a knowledge of the principles of agriculture before they settled in life? It may, indeed, be asked in what way the education of a university at present fits the sons of our landed proprietors for their future most important calling, if it dismisses them from its halls without a single lesson upon the treatment of the land. The proprietors of the present day are favourably distinguished from those of the past century by the knowledge they possess of rural affairs, and the interest they take in the diffusion of agricultural knowledge. But it surely were better that the first principles of this knowledge should be acquired at the school and university, than that the young proprietor should be left to pick up a less perfect and desultory information from the chance sources which may afterwards fall in his way. Nor is the rule unworthy of imitation now adopted in Holland, which prescribes to all students who are preparing for the ministry in the established church a regular course of agricultural study during their stay at the university.

"5thly. But besides all these insertions of agricultural instruction into our existing institutions, which could be accomplished at a very little cost, either of time or money, by willing parties, there is one other independent step which the actual condition of rural instruction in this country appears to me at present to recommend. I am not sufficiently aware, as I have said, of what the views of the Society of Arts are, to know whether it is likely to be embraced by the scheme they have in view; but as you have asked for a summary of my views in full, I shall briefly state the nature of this independent step.

"Many persons have been of opinion that separate or purely agricultural schools and colleges ought to be established for the sons of farmers. Ireland, at this moment, possesses a considerable number of such schools, which are reported by Dr. Kirkpatrick, the Government Inspector, to be in a flourishing condition; and the necessity for larger schools, under the name of colleges, is supposed to be met, in that country, by the establishment of Chairs of Agriculture in each of the new Queen's colleges. In England, the college of Cirencester is the offspring of such a conviction on the part of many zealous friends of English agriculture. But this college, as a place of training for the sons of farmers, has proved, in a great measure, a failure. The pupils are rarely the sons of farmers; and the tendency now, I believe, is rather to educate land-agents, and a higher class of gentlemen, or proprietor farmers, than to intermeddle with the sons of the English tenantry in general. A college like that of Cirencester presents two difficulties to the plain farmer. The expense of the education he finds to be too great, and he fears lest his son may acquire tastes or habits at the college which will set him above his profession, and thus unfit him for succeeding and assisting his father. Still the want of education is felt. The benefits which more instruction would impart to the son are obvious to the father, and he would gladly em-

brace any opportunity of enlightening his mind which was at once economical, and not hostile to the habits of common rural life. The demand exists, therefore, for an institution which should impart to those who might frequent it all the knowledge in reference to rural economy which modern science has so successfully brought together—which should do so at a cheap rate, and which, in doing so, should not attempt to change the plain farmer's son into the university gentleman. Now these ends, I think, might be fully and economically attained by an institution which should dispense with the *collegiate* system; merely opening lecture-rooms, libraries, and collections to the student for a certain annual charge, as is done in continental universities, and in Scotland. It is the living in college which directly or indirectly entails the greater part of the expense of a university education, and begets those habits which unfit a man for the ruder life of the practical farmer. It is this also which leads to expensive buildings, and creates the demand for larger sums of money to provide the necessary college accommodation. To meet the case of persons who might wish their sons to be under constant superintendence, one or more lodging houses might be specially licensed; but the body of the students should be left to choose the locality of their lodgings, and the style of living for themselves.

"With this preliminary regulation, I would provide courses of lectures on the several necessary branches of agricultural education, to be given *during the four winter months only*, when little work was to be done upon the farm, leaving the pupils at liberty during the eight other months to work at home, and learn practical agriculture under their father's eye.

"Now, as to the expense of such a system of instruction as this, I suppose the pupil to attend four months, at a fee of two guineas for each course. This makes eight guineas, and if we allow for books and writing materials half as much more, we have twelve guineas for instruction. Then, as to board and lodging: those whose means are small will live humbly and economically, and may bring many of their supplies from home, so that the necessary expenditure under this head will, in their case, be comparatively trifling. Every one knows to how many privations the love of knowledge has induced young persons to submit; and it is the advantage of the plan proposed, that it will offer all the means of learning to those who can raise in ready money the minimum sum of eight or nine guineas a year. Suppose twelve guineas to be taken as the average cost of board and lodging during the four months, then the whole expense of a season at this agricultural college would be only twenty-four guineas, or say twenty-five pounds. There are few of our better farmers who would grudge such an outlay as this, especially when their sons were to remain under their own eye for all the active part of the farming year.

"Then, as to its *efficiency:* four lectures a day on four different subjects, with the necessary reading, would keep the pupil fully employed; and without here entering into details, there is no reason to doubt that in two such sessions well improved, a very considerable amount of knowledge might be acquired of the various branches of science in their relation to rural affairs. The full course of training might embrace three sessions; and while certificates of attendance

and merit might be given to those who passed examinations on the subject of one or two years' prelections, the regular diploma might be reserved for those who submitted to a complete examination after a triannual attendance. Such an arrangement would, I believe, render the benefits of the institution very generally available by all classes of the rural community.

"You will see that this system implies economy, not only to the pupil, but also in the establishment of the institution itself. It implies the situation of a locality where lodgings for the public, at different rates of charge, would not be difficult to be obtained; but this necessity would probably bring along with it the advantage of being able, at a moderate cost, to secure the necessary accommodation for lecture rooms and collections. Then the four months' duties might not demand an equal remuneration to the teachers, as if their whole time were occupied. The teacher of practical agriculture, for example, might himself be a farmer, employed for the rest of the year upon his farm. The management of estates might be taught by a talented land-agent of the district, or by one whose connection with the college in this capacity would soon secure him lucrative employment of this kind. Veterinary surgery might be both taught and practised in a similar way, and others of the staff might, no doubt, be engaged on similarly economical conditions.

"One such institution being established, it would of course be proper to wait for a few years to see the measure of success with which it was attended. The result would determine how far similar institutions, in other parts of the island, ought to be recommended.

"Such is a general outline of the steps which, it appears to me, it would be advantageous to the country at large, and especially to the rural community at the present time, to take for the better diffusion of scientific knowledge in its relation to practical agriculture. I regret that the pressure of other engagements should necessarily render my sketch so hasty and imperfect.

"I have the honour to be,

"The Rev. Dr. Booth, F.R.S., "Your obedient Servant,

"Society of Arts." "James F. W. Johnston."

[2415.]

Mr. Henry Bence Jones, M.A., F.R.S., thus observes:—

"Whatever has been said of the important advantages of classical knowledge, may be repeated, with far more truth, of natural knowledge. As a means of developing the powers of the mind, — as improving the powers of observation, — as tending to accuracy and truth, —modern chemistry is beyond all the knowledge of the ancients."

"If pictures teach better than letters, it is because things are more instructive than words."

"VI., VII., and VIII. The result of the teaching should be tested

half-yearly by paid inspectors, or examiners, who should determine the rewards to the pupils and teachers, which should be given by Government."

[2860.]

Messrs. Joseph Jubb and Sons, of Batley, near Dewsbury, write, —

"Your circular, dated February 5th, would have been answered earlier but for the indisposition of the writer. In reply to your remarks, we beg to say that we approve generally of the objects you contemplate; we are quite of opinion that it is now highly necessary that manufactures, particularly textile, should be conducted and based on scientific principles, which is far from being the case at present.

"With respect to the points on which you request our opinion, we beg to state that the Suggestions 3 to 5 and 6. are excellent, and if carried out would be highly beneficial. Much may be done to render the manufactures of this country more economical, more perfect, and more conformable to the dictates of enlightened science."

K.

Sir Robert Kane, F.R.S., President of the Queen's College, Cork, thus writes to one of the Committee: —

"When the Queen's Colleges were first opened in 1849, we found great difficulty about the preparation of our students for entrance. The existing classical schools were all so identified with Trinity College, Dublin, — the entrance course of which constituted all they were used to teach, — that in many cases they refused to let the books of our entrance course be read in the school; and almost universally they rather deprecated and advised the boys against going to the Queen's Colleges.

"However, a great deal of that has already passed away, and I have great hopes that all will very soon be changed.

"Two young men who have been educated by us in Cork, and who gained the highest honours at the degree examinations last October in Dublin, have taken a large school in Cork, and will, I believe, carry it on actively on the best and most modern principles. The impetus of improvement in the classical (secondary) schools is, therefore, already and happily given, and it has descended from the colleges. It will thereby become influential on the education of a large class who do not proceed for a regular University education, but whose instruction will altogether consist in the course which the higher class

will read for college entrance. This I regard as one of our happiest results, as far as the general improvement of education in Ireland is concerned."

"The Rev. Dr. Booth, F.R.S.,
"Society of Arts."

[2138.]

The Rev. John G. Sheppard, M.A., Head Master of the Kidderminster Grammar School, writes as follows: —

"I have now no time from my numerous engagements to reply at length, but, as I should be most unwilling that my name should be omitted from any list of persons willing to entertain the questions to which you refer, I venture to trouble you with these few lines expressive of my perfect willingness to co-operate in any *well-matured plan* for promoting general education.

"Perhaps this place presents as much as any other the difficulties and wants which require consideration. There are a large number of manufacturers and respectable tradesmen, whose children require the superior sort of education now, I believe, very generally given at the grammar schools throughout the country; then there are the children of the small tradesmen, foremen of manufactories and the like, whose wants are somewhat different; and, lastly, in large numbers are the children of the very poor, principally weavers, who enter upon their trade at an early age.

"To combine the teaching of all these together would be very undesirable, were it not impracticable. Yet could something like unity of method and action be introduced, as is done in Birmingham, by having schools in connection with the chief grammar schools and under the master's supervision, possibly some beneficial results might be obtained. The upper masters might contribute by examinations, short popular lectures about common subjects, and general supervision of the *Text Books* employed, to prevent much mischief and waste of time, as well as to give some information not otherwise attainable.

"A *single* set of apparatus, such as globes, maps, &c., under the care of the chief master, would in this way do the work of many. Nothing could be more desirable than aid from the Society in all such matters as these.

"If even the Society would superintend the *execution* of such things, and send them into the world under their sanction and guarantee, a great benefit would be conferred upon education. A single map of England, upon *a large scale*, and executed upon *Baurkeller's* plan, I have no hesitation in saying, would do more towards diffusing a correct knowledge of geography than all the books which have been written for the last ten years. Of course, I am speaking of my experience among *boys*, and boys of the middle classes. Similarly we want a recognised text-book in English Grammar, and in many other subjects too numerous to mention, which the Society might take in hand. Suppose a prize was offered for the best Manual of the kind."

L.

[3519.]

From Robert Gordon Latham, M.D., F.R.S.

"29. Upper Southwick Street, Hyde Park Square, March 23. 1853.

"My dear Sir,—I have the honour of acknowledging your circular of February 5., and when I add that I have been absent from England during a considerable portion of the intervening time, I trust that my delay in replying may be excused. It has certainly not arisen from any want of interest in your plans.

"The claim of the Society of Arts to take the initiative in a movement like the one proposed, lies (I presume) in their will and power; and, in my mind, these are sufficient credentials.

"The time for making the Government a party to it is well chosen. Nevertheless, as Government influence is the price that is paid for Government co-operation, the case upon which they are called in should be a strong one. When the popular branch of our legislation has been strengthened, less caution will be requisite.

"I am not afraid of the classical scholarship of Great Britain being impaired by any advance, however great, of science. It may change its character—and this it is doing; but I do not expect that that character will deteriorate. The imperfection of the existing methods of teaching makes it quite probable that with an increase of educational knowledge, the present average amount of scholarship may be attained by a less expenditure of time than is the case at present. Something has been done in this way already, and more is doing; hence the notion that we cannot teach one subject, except at the expense of another, is to a certain degree exceptionable.

"These remarks arise out of the contrast which occurs, or rather which is implied, in your circular between the "elements of the only knowledge" existing in the time of our forefathers and the elements of the knowledge of the nineteenth century; and undoubtedly there is *some* antagonism. We may measure this by the difference between the man who has made his reputation by editing a Greek Play, and the man who has made his reputation by discovering a series of salts; yet this difference rapidly becomes less.

"Again: in some departments of even the more practical and industrial forms of art, the scholar and the artist meet; and if these points of contact were multiplied, so that Classical Archæology and Classical Æsthetics took their proper prominence in the higher courses of instruction, all parties might be the better for it, and our literature might, perhaps, be enriched by an English equivalent to the Laocoon.

"I fear less for classical scholarship than for certain other branches of knowledge. However wide we make the circle of industrial education as a means of promoting Arts, Manufactures, and Commerce, &c., it still remains a *trade* education instead of a *professional* one—as special as that of the lawyer, the physician, the clergyman, or the naval officer. Its value is measured by the economy of production it can develope. Now this is not education in the best sense of the word, since true and proper education is tested

by its effects upon the mind and character of the hearer. It is a moral and mental discipline rather than an instrument of industry.

"This involves an objection only so far as the Society departs from its described domain of industrial education, or, limiting itself thereto, confounds the two kinds. Such confusion is easily engendered. All education in Great Britain, and perhaps elsewhere, is more or less sectional and special, and consequently, incomplete; character is far from being recognised. The claims then of the Society's plan must be limited to the teaching of certain important and practical branches of knowledge, and to the teaching of these *well*—no pretence to the exhibition of a normal or model system of education being put forward. With this limitation, however, its claims to support will be of vast magnitude.

"The practical bearing of this becomes patent, if we apply it to the second of your suggestions, viz., "The conversion of the present Mechanics' Institutes into Industrial Colleges." There are certainly some of the former where the range of subjects is at the present moment wider than it would be under the contemplated regime. In case of an alteration, there would in these cases be the displacement of some subject or other. *History*, for instance, is one of such. I do not say that upon the whole the institution might not be a gainer; I only throw out a point for consideration.

"I think, too, that such branches of knowledge as physiology may run some chance of being thrown in the background, and along with physiological, a large section of natural science.

"For, say what we may about industrial applications touching all points of the vast circle of science, the practical working of a plan like the one in contemplation will be, to teach chemistry, and design; and, next to these, certain departments of geology and mechanics. A school of mines, and a school of design, a laboratory—these will give the "nine parts of the law" in prospect.

"The members of such mechanics' institutes as entertain the plan of conversion into "industrial colleges" must thoroughly understand, as a preliminary, in which of the two predicaments their case stands; *i. e.*, whether industrial education is laid before them with its limitations to the field of practical industry; or, whether the Society will give them an industrial education, *and something more.* They must then compare the range of their own subjects with the limitation of those of the Society.

"The extreme to which these may differ may be understood by putting ourselves in the position of an educationalist, of a somewhat different turn of mind from the industrial teacher. Let us take a man whose practical tendencies are political rather than commercial; a man who, seeing evil in both popular ignorance upon moral, economical, and political questions, and in popular ignorance respecting the science of production, considers that, of the two, the former is the more dangerous. Let us take, along with a man of this kind, the undoubted fact, that in many parts of the kingdom lectures and discussions of a political nature are the chief vital elements in the true mechanics' institute.*

* This means a mechanics' institute adhering to its original constitution, from which the majority have greatly deviated.

"Let us see no danger in this; but, on the contrary, more good than evil.

"Such a temper and such a fact engender great jealousy towards any movement by which any portion of the politician's important subjects might by any possibility be displaced; or, take the case of a man whose acquirements be in literature, not without a dash of the *dilettante*. He, again, will be jealous of the encroachments of an instruction too predominant over his own.

"Ascertain, then, the exact extent to which form teaching is special, and admit it without reserve; and, in doing business with the mechanics' institutes, say not only what you will teach, but what you will *not*. Those bodies will then be practicable or impracticable, just in proportion as their own previous tendencies have been industrial; *i. e.*, in the same direction as your own.

"Where they diverge beyond a certain point, leave them alone.

"The effect of this will be, that in some cases you will have an industrial training, *ex professo*, while the political, literary, and other branches of knowledge are left to take their chance. In others, you will have a certain amount of thought expended upon politics, history, and literature, with chemistry, mechanics, and geology shifting for themselves, and the chances on neither side will be bad. A full and perfect model education is what most men can receive, no man impart, and but few desire. It is not to be dreamed of by this generation; possibly not by the next. The best we can do is to select our subjects well, distribute them judiciously, and teach efficiently, leaving the rest to the collision of daily life. In this way we come to be educated by *parties*, just as in politics we are governed by them.

"These remarks on the preamble of your circular, have to a certain extent anticipated the criticism of your suggestions in detail, especially No. 2. No. 1. and No. 6. I will notice together.

"No. 3. Will it not be a waste of power to treat with the proprietary schools too much in the first instance? I imagine that from their being comparatively untrammelled by precedent, prescription, and prejudice, they are not likely to be obstructive to any movement likely to succeed at present; they fluctuate between a "system adapted to the middle classes," and on the "university system,"—free to adopt the one which thrives the best. During the transitional period, their characters will vary with that of the master.

"No. 4. *Aid in books*, &c. A publisher is the proper critic of this suggestion. It is a question of *more or less*—*more* or *less* in respect to what constitutes the first instance; and *more or less* in respect to the extent of the reduction of cost. However, whatever you do, *pray* don't job in book-making. In the diffusion of useful knowledge, as in American slavery, it is cheaper to buy than to breed. When societies take up the "tract" line, it is hardly possible for them to be creditable. The good men write bad books, because they write "down" to their readers; and the bad men write good ones, because they plagiarise. It is only the religious societies that take to literary piracy with impunity. Mere societies of art must be honest. It does not do for respectable corporations to live in the bodily fear of injunctions.

"No. 5. *Systematic and defined course.* Fix them in the first in-

stance, 1, 2, before you begin to treat with the mechanics' institutions respecting their conversion into industrial colleges. They will then know what each party is about, and the amount of change involved.

No. 6.—1 and 2. The stimulus supplied by exhibitions, scholarships, &c., should be limited; and, probably, it should be not extended beyond a few years from the beginning of the working of your plans. The "ways and means" may safely be left to industrial liberality; I believe that this, generally, wants checking rather than encouraging. In the eyes of many this is perhaps an over-sanguine view. Nevertheless when a good thing is to be done, and the advantage is to be spread over great masses, experience (on my mind at least) justifies confidence. If well distributed, a little goes a long way.

"This limits the amount of encouragement as tested by the amount of endowment *actually created for the occasion.* But there are methods by which, to a certain extent, existing supplies may be made available.

"A grammar school exhibition, at present devoted to the encouragement of classical learning, in some cases lapses, in others ought to lapse, from the insufficiency of the candidate. In such cases they might be awarded to the best proficient in some industrial branch of science. In many cases the details of these endowments and their conditions are complicated, and supply objections; none, however, which seem insuperable.

"In many large towns where the smallness of the living is unfavourably contrasted with the amount of population, subscriptions are entered into by the leading people for the sake of an evening lecture or some similar service. In many cases this arises out of the simple wish to hear additional sermons and additional portions of the Liturgy. In far more, however, the subscription is neither more nor less than a testimonial to the officiating minister, and a practical recognition of the insufficiency of his legal remuneration. In such instances the additional service may be replaced by clerical lectures on secular subjects.

"I don't say this could be effected at once. I think, however, a certain amount of diffused information respecting the real necessities of the industry of Great Britain would ensure it sooner or later. Neither could I draw the line between grammar schools connected with the university, and grammar schools not so connected—too strictly, in most cases, the connection is a case of *more or less;* the link being sometimes that which exists between Eton and Winchester with Cambridge and Oxford, sometimes that of a single exhibition and scholarship.

"Neither would I overlook the influences exerted by the training schools, in which industrial knowledge may easily be made a more prominent element than it is at present.

"Lastly, I would remark that, although the industrial condition of the rural districts has evidently commanded some portion of the Society's attention, the prominence given to the town institutions in the circular has a tendency to engender the notion that the manufacturers of corn and meat have been unduly subordinated to those of cotton, silk, &c.

"R. G. LATHAM."

[2482.]

From Mr. Thomas Perry, Head Master of Ledbury Endowed Grammar School, Herefordshire.

"Sir,—I am in receipt of your communication, and, in reply, beg to inform you that the subject of supplying a cheaper, more efficient, and more *practical* education to the middle classes has long engaged my attention. Living, as I do, in the midst of a purely agricultural district, I am not qualified to say much on the subject which your communication seems more immediately to contemplate —the supplying, at a cheap rate, to the middle classes, a good mathematical and philosophical education in lieu of the old routine of Latin and Greek; but my observations have long since brought me to the conclusion, that much, very much, requires to be done for the agricultural districts before agriculturists can be brought up to a level with their equals in the manufacturing districts in point of education; and I think that no time could be more conspicuously chosen for the attempt than the present, when the distress under which agriculturists and those depending upon them have been suffering for the last six or seven years would make them perfectly ready to fall in with any scheme which offered them the opportunity of obtaining a cheap and efficient education for their sons; and if we poor country schoolmasters could but once succeed in shaking off the shackles which the undue influence of parents puts upon us, we might then be in a position to strike out for our pupils a course of education more consonant with the requirements of an advanced age. As an example of this, I may mention a fact too well admitted and too generally understood to be liable to a moment's doubt, viz., that the English farmer of the present day ought to possess a good working, practical knowledge of at least the outlines of chemistry, and some acquaintance with the outlines of geometry and mechanism; and yet I will venture to say that, out of a large number of pupils who have been under my charge during the last two years, not a dozen of the parents would allow them to remain long enough at school to acquire even the elements of these, in my opinion, necessary sciences, meeting all arguments with the century-old assertions, that plain writing and accounts were all they wanted, and that, in their opinion, such things do not make better farmers! You may say that mine is an exceptional case, and that the farmers of Herefordshire are behind the world in these matters; but this I do not believe; for my own inquiries, and the information I have been able to glean from various quarters of the country, lead me to the conclusion that in purely agricultural districts education is most wofully undervalued.

"Your allusion to the revival of the old grammar-school foundations I hail with pleasure; and I believe it would, in most instances, be found a matter very easy of accomplishment, if only it were thoroughly agitated and the cause supported by some leading men. You may, perhaps, accuse me of being egotistical if I again allude to my own cases; but I am fully persuaded, if you can only get schoolmasters generally to give you their own *experiences* and *their own* difficulties and wishes, you will be in a much better position to judge of

the real merits of the case. I am master of a grammar school of King Edward VI.'s foundation, unfortunately endowed with a monetary pension from the Woods and Forests instead of land. Various bequests have from time to time undoubtedly been made to the school; and 'the oldest inhabitant' can point to several houses and pieces of land which he has heard 'once belonged to the school.' On my appointment some six months since, I found it in a most wretched position. There were no deeds, no trustees, no property, and no scholars. The endowment still remains at the original 3*l.* 11*s.* 3*d.*; and the school-house, in a ruinous state, situated in a dark, narrow, dirty lane, is three feet below the level of the surrounding soil, with the town ditch running under the whole length of the building, and separated only from the house by a board floor. By tradition it seems to have been customary to receive *four* free boys; but, owing to the badly conducted state of the school lately, nobody has cared to trouble about the filling up of vacancies. Now in this case it occurs to me, that the first step towards restoring the school to a state of usefulness would be for the Commissioners of Woods and Forests to pay the pension in the *present* value of money, which, at a moderate computation, would be about fifteen times the original sum. It was but yesterday a statement appeared in the morning papers to the effect, that the Commissioners of Woods and Forests had a clear balance of 216,591*l.* 6*s.* 11*d.* Now, if deans and chapters, and other corporate bodies, are to be obliged to mete out a scanty share of justice in such matters, surely, of all others, Governments ought to be doubly bound to do so. It also appears to me, that as the Commissioners of Woods and Forests have the payment of the pension, they stand, or ought to stand, in the place of trustees to schools of King Edward's foundation, which may happen to be in such a case as mine, and that it is their bounden duty, out of the immense surplus revenue they have in their hands, to take some steps to restore such schools to a state of usefulness. My scheme is this: — Let them send down a commissioner to inquire into the state of the school-house, property, &c.; and then, if they find the house in so dilapidated a state that it is unfit for the purpose of a school, or for the master's residence, let them spend some of the many years' arrears of balance, accumulated by an inadequate payment of the pension, in buying or building a suitable school-house; and then, by paying the real value of the pension according to the present value of money, they may expect to get talented masters fully qualified to carry out a liberal and systematic course of industrial training under the superintendence of a Government Commissioner, charged, like the National School Inspectors, with the duty of examining into the progress of the pupils, and the manner in which the master fulfils his duties.

"Of course I do not for a moment contemplate claiming all the advantage in such a restoration for the master. If his endowment were restored as I say, he must naturally be expected to enlarge the number of the pupils on the foundation; and herein, again, I think we might follow the plan of the National Schools with advantage. Instead of having *four free* boys, I would be prepared, on the receipt of about 50*l.* per annum, and a proper school-house and residence, as endowment, to receive 25 boys instead of 4, and give them, for 1*l.* 1*s.*

per annum, the same education as that for which I charge my private pupils 6*l.* 6*s.* This latter number (25) would be amply sufficient for the present requirements of the middle classes in this town; and the small annual payment of 1*l.* 1*s.* would, I think, be found to answer well, partly on the principle, that what can be had for nothing is little valued, but principally through the moderate right of interference it would entitle parents to exert in the management of the school.

"In such a school as that here contemplated, any of the objects you appear to have in view (such as founding scholarships, supplying cheap books, maps, plans, &c., giving prizes, &c.) would be highly valuable, and would be found a great stimulus to the efficient working of the school; but as a preparatory step, let me again impress upon you the necessity of petitioning and agitating on the subject of the responsibility which rests with Government for allowing to fall into ruin that truly magnificent scheme of real Government Education which originated with the pious Edward the Sixth, and for the satisfactory working of which every successive Government ought to consider itself responsible.

"I do not say any thing about any other endowed grammar schools, which may be in a more flourishing state; my experience has never lain among them; but I consider many of the points you mention as being under your consideration might be effectually applied to them immediately.

"With many apologies for the length of this communication, and truly hoping that your endeavours may be crowned with the success they deserve, &c."

[2536.]

From Mr. R. R. W. Lingen, Secretary to the Committee of Privy Council on Education.

"Council Office, Feb. 12. 1853.

"Sir,—I should be very glad to see industrial instruction (as defined in this prospectus) introduced into popular education.

"I should, however, much regret to see the acquisition of information, however apparently useful, set above intellectual discipline, in the *primary* steps of education.

"I see no ground to recede from the opinions of our predecessors, who regarded grammar and mathematics as the best instruments of intellectual discipline. I am not aware that they generally regarded these studies as comprising the whole of education, although, in founding primary schools, they may often have mentioned none other.

"I shall entertain better hopes of a plan that proposes to add to the superstructure, rather than dig up the foundation, of education as it has hitherto existed in this country.

"Your obedient servant,

"R. R. W. Lingen."

[2028.]

From the Rev. John S. Howson, M.A., Principal of the Collegiate Institution, Liverpool.

"Collegiate Institution, Liverpool.

"Sir,—I am so much gratified by seeing the paper which you have sent me, that I write immediately to thank you and assure you of my sympathy and readiness to co-operate with you. The importance of a large and systematic development of industrial instruction has been strongly impressed on my mind of late. I was aware of the efforts made by the Society of Arts, and was only prevented, by very pressing occupation and state of health, from communicating with the Society last year.

"I am only able to write in general terms at present; but I would just say this—that we are concerned here, not with *manufactures*, but with *commerce*, and that the industrial instruction which is here locally most important relates to *raw materials, commercial statistics, physical geography*, &c. It is to such subjects that I wish to give my chief attention, and I shall be extremely glad to be in communication with you respecting them.

"I have the management of three schools which contain about 650 boys, nearly all destined for commercial life, and of course am in frequent communication with the merchants here.

"I could say something on all the heads of your letter; but at present I cannot write more. I fully agree with what you say about 'self-support' and 'self-government.'

"I am, &c."

[2341.]

Extracts from the Minutes of the Board of Directors of the Liverpool Mechanics' Institution.

At a meeting of the Board of Directors of the Liverpool Mechanics' Institution, held on Monday, 7th February 1853, George Holt, Esq., Chairman,

The following resolutions were submitted by the Evening School Committee:—

"1st. That the Committee have received with feelings of lively satisfaction the Circular from the Committee on Industrial Instruction of the Council of the Society of Arts, in reference to the improvement of the organisation of mechanics' and other popular institutions, so that they may become efficient instruments for promoting a thorough and comprehensive system of industrial instruction, and that they are equally gratified by the assurance that great efforts may now be speedily looked for to provide such instruction on a national scale.

"2nd. That the primary object contemplated by the founders of the Liverpool Mechanics' Institution, in 1825, was to secure to artisans the means of acquiring a really sound and useful education, an education such as should not merely serve to improve their general culture, but to extend their knowledge and improve their taste in

the direction most necessary to render them more skilful and more successful workmen, and that this is still recognised as the cardinal point to which the best efforts of the Board must always be directed.

"3rd. That, for the realisation of this purpose, lectures of a popular as well as of a more scientific character have been provided, classes to meet in the evening hours have been organised, a library containing about 16,000 volumes, a gallery of sculptures containing upwards of 350 specimens of ancient and modern art, a museum of objects of natural history, and a collection of philosophical apparatus have been formed, while the establishment has been built and furnished at an expense exceeding 25,000*l.*

"4th. That although the measures which have been adopted have doubtless been successful in a high degree in improving the state of general education among the great body of the people of Liverpool, no fewer than 15,000 individuals having been enrolled as pupils in the evening classes or as auditors at lectures, the Board have to regret that the more special object of the institution, namely, that of imparting to workmen a knowledge of the scientific principles upon which the exercise of their several callings depends, remains to a large extent still unaccomplished.

"5th. That the opinion indicated by the Committee on Industrial Instruction, on the subject of popular lectures, is quite in accordance with that arrived at by the Board, who for the last two years have ceased to make any arrangement in this direction, on the ground of the comparative inutility of such lectures for the purpose of real instruction, being satisfied that knowledge of a really fundamental and practically valuable kind will always be most speedily and economically secured in classes systematically arranged and conducted so that every pupil be subject to repeated examinations, to test the progress he has made.

"6th. That the evening school, attended regularly by from 450 to 500 pupils, who pay fees ranging from 2*s.* 6*d.* to 9*s.* per quarter, is now divided into eighteen classes, of which seven are devoted to English, including grammar, history, geography, and composition, writing, book-keeping, and arithmetic, one to mathematics, natural philosophy, navigation, and nautical astronomy, four to drawing, two to French, one each to Latin, German, and Spanish, and one to dancing, and that the number of pupils receiving instruction in the several branches are as follows:—

English, writing, and arithmetic	339
Mathematics	35
Drawing	110
Languages	38
Dancing	10

"7th. That classes more advanced than any of those now in operation, for instruction in the application of mathematical science to the constructive and mechanical arts, and on the principles of chemistry and its practical application, have repeatedly been established with hopes of success, but that all such classes have, after a brief existence, uniformly failed, and always, as the Committee believe, from the same cause, namely, from the want of the requisite degree of previous training on the part of a very large proportion of the pupils who

came forward, their consequent inability to appreciate the instruction offered, and from their attendance thus becoming, instead of an intelligent and interesting pursuit, a dull round of unmitigated drudgery.

" 8th. That this, in the opinion of the Committee, is the most formidable obstacle to be encountered in all attempts which may be made to instruct the artisans of our country, in a satisfactory manner, in the principles on which the practical arts are based; and by a knowledge of which alone it is possible adequately to improve in any department. That it was with the view of obviating this difficulty, that classes of a purely elementary kind were first established in the evening school; and it was for the same reason that day schools of an improved character were subsequently founded in connection with the institution; but, notwithstanding everything which has been done through the immediate agency of this establishment, and everything which a steadily improving appreciation of the value of education has effected otherwise, this difficulty is still felt so severely, that only one year ago, the Directors were obliged to abandon a class for special instruction, in the application of the principles of mechanics to the constructive arts, solely upon this ground.

" 9th. That there is clearly no satisfactory remedy for the state of matters, excepting in a widely extended system of practical education for the great body of the people, and this, even in the most favourable circumstances, must necessarily be a work of considerable time. That, meanwhile, the Committee are of opinion, that much may be effected towards inducing a better state of things, if Her Majesty's Government can be prevailed on to announce a well-digested curriculum of study for artisans, to recommend the same for adoption in all popular institutions, and to offer certificates, prizes, exhibitions, scholarships to pupils of the highest order of merit, on their completing certain prescribed portions of the said curriculum, whether the studies may have been pursued at school, at college, or in a mechanics' institution.

" 10th. That the Committee give their opinion as to the great value of a curriculum of study, prescribed by authority, which must be recognised as competent, all the more unhesitatingly, because of their experience of its importance within the last two years, in their efforts to improve the character of the drawing classes, and to consolidate them after the manner of the Government Schools of Design. That but for the fact that they had the authority and example of the Government Schools to refer to, the Committee are fully persuaded, from the strong repugnance exhibited by the great majority of the pupils to a course of study, so much more regular and severe than anything they had before seen or been accustomed to, that instead of being able to report now of the art department as in a comparatively healthy and prosperous state, they would long before have been compelled to announce empty benches and closed doors.

" 11th. That the Committee believe, moreover, that besides cheap supplies of books, models, and other apparatus, as suggested in the Circular of the Industrial Instruction Committee, great benefit would be found to result from periodical inspection and examination of all schools professing to afford industrial instruction; and they would further suggest that all schools, such as that one over which they more

immediately preside, would be materially aided in their efforts, were the Inspectors to deliver a few lectures, on the occasion of their visit, either with the view of illustrating the advantages resulting from particular courses of study, or communicating information as to the state of other countries, or of other districts in our own country, in regard to such education ; and that here again the Committee would adduce, in support of their views, the excellent effect of Mr. Wornum's lectures on ornamental art, in conveying much valuable information, and infusing fresh life into the drawing classes.

" 12th. That the Committee desire to co-operate most heartily with the Committee on Industrial Instruction of the Society of Arts, and to profit, in the management of the Liverpool Mechanics' Institution, by any suggestion which they may offer. That the Committee consider the question of Industrial Instruction as the most important to which their attention can be directed, and will always be ready to make renewed exertions to secure to their fellow townsmen increased facilities for attaining such instruction as shall be, to the greatest attainable extent, commensurate with the requirements of the times in which they live; being satisfied that this is not only desirable as a means to a higher general culture, but that it is necessary, nay indispensable, to enable the British artisan to sustain, with due credit and advantage, a competition which daily becomes more severe, with a better educated class of workmen on the continent of Europe."

The resolutions of the Evening School Committee were confirmed unanimously.

The following Resolutions by the Day School Committee, were then submitted :—

" 1st. The Committee have received with much satisfaction the Circular from the Industrial Instruction Committee of the Council of the Society of Arts, in reference to the state of education throughout the country; and are much gratified by the assurance that strenuous efforts may be confidently looked for, with the view of extending the courses of study pursued in the grammar and other endowed schools, and of introducing, on a large scale, improved systems of instruction for the middle classes.

" 2nd. That it was under a deep sense of the great need which existed for an education of a much more practical character than that offered in the public schools, and which should be readily accessible to all, without reference to party distinctions or religious differences, that the day school, in connection with the Liverpool Mechanics' Institution, was established — the Lower School, in 1835; the High School in 1838, and the Girls' School in 1844 ; and that, in these different schools, it has been the constant care of the Directors to secure for the several classes of pupils an education such as may be found of the greatest practical value when they come to enter upon the active duties of life ; whether they may be destined to take their places in the workshop of the artisan, at the counter of the retail tradesman, in the office of the merchant, in the studio of the artist, or in the chamber of the professional man.

" 3rd. That while the success of these schools, supported as they are entirely by the fees of the pupils, which range from 3*l.* to 14*l.* per annum, has been on the whole highly gratifying, not fewer than

5500 individuals having been educated within their walls; and the daily attendance now being from 800 to 900, the Committee feel assured that their efficiency and prosperity may still be greatly promoted, by such aids as are suggested in the circular of the Society of Arts; having a cheap supply of such books, maps, models, and such other apparatus, as may from time to time be required, and by the foundation of prizes, exhibitions, and scholarships, to be competed for by the pupils, after they have completed certain prescribed courses of study.

"4th. That the Committee can imagine no measure by which the vital interests of the entire country may be more surely promoted, than by a widely extended system of really practical instruction for youth; and while they will always consider it a high privilege to use their utmost efforts to ensure its speedy realisation, it must ever be with them a source of lively gratification to reflect that, besides the direct benefits conferred on numbers so large by the immediate agency of the day schools of the Liverpool Mechanics' Institution, their example has led, not only to the establishment of many other schools, both here and elsewhere, professing similar aims, but that it has served at once to raise the tone and improve the character of the education now offered over the entire north of England.

The Resolutions of the Day School Committee were also confirmed unanimously.

Extracted from the Minutes.

"By W. Nicholl, Secretary."

[2103.]

From Professor George Long, M. A., of 12. Hanover Crescent, Brighton.

"Sir,—I suppose that your Society wish to know how far persons who have been engaged in education, agree with their proposed objects; and probably they may wish to know the opinions of those who have been and are employed in the established system of education in this country.

"Perhaps you know, but more probably you do not, how I have been employed. I was brought up at Cambridge, where I learned a little, but was taught nothing. Perhaps my university would think this an ungrateful declaration; but it is true. I have taught in the United States, in the University of London, and now am teaching at Brighton College, which is a kind of proprietary school. I have taught Latin and Greek, Geography ancient and modern, History, and once, for a few years in London, Law.

"You will see that my studies belong to the old time; but I have endeavoured to give them life, and usefulness, by explaining ancient books by the aid of modern knowledge. The teaching of the Latin and Greek, as languages, has taken up much of my time; and when they are well taught, I am convinced that they are an excellent study for those who can give to them the necessary time, under a good teacher.

"After near thirty years of this experience and much reflection, I

have long come to the conclusion that the studies of this country ought to be greatly reformed. More has been done perhaps in the way of change and improvement than you suppose; and the sentence in your first page, which begins 'little solid advantage,' seems to me to require some modification before it will be accepted by those who are well acquainted with our grammar schools. I mean of course those whose education and understanding enable them to take an enlarged view of our social state and its present wants. Many persons will dissent altogether from what you say.

"The institutions in America are based on ours; they are too much like ours. They have some new and good things; but a great deal that is not good. I am speaking of the large part of them—there are exceptions to the general rule.

"I think that all our youths require a different training. The hand and the eye should be well educated from an early age. Drawing, for instance, in all its kinds, should be well taught; and a certain amount of chemical manipulation is very good for those boys who have a taste for it. We have chemical lectures in Brighton College. Some boys merely attend the lectures, see the experiments, and get some fundamental principles; others work occasionally in the laboratory, and I am told that some youngsters have shown great skill and capacity.

"Under drawing I include delineation on paper. I have had some boys who have produced excellent maps.

"In teaching geography, my first business is to lay down clearly the large physical features of a country, and then to give such particulars of coast, rivers, rocks, soil, and climate, as will convey an exact knowledge of a country, as the habitation of man and as supplying the materials for his industry.

"I have stated what I have done, and am doing, by way of preface to what I am going to say. I approve altogether of your proposals. But I know that it is not necessary to banish Latin and Greek in order that other things may be taught. As to Greek, it is with many boys quite a waste of time. They learn a few years, and then give it up; and have little or nothing to show for their pains. I think that under an improved system, fewer would learn Greek, and none would begin it who did not mean to learn it well.

"As to Latin, I know that it can be taught well, in a much shorter time than it is; and without interfering at all with other useful studies, such as you propose. It is very true that many youths need not learn Latin even if it could be taught well and in a much shorter way than it is at present. But for all who would have something of a liberal education, Latin is necessary; and its uses in many ways will be admitted by every one, except a few who are as bigoted in their way as the old Latin and Greek pedants in theirs.

"As to the mode of making any change, that is not so clear. But changes in opinion and practice are rapidly going on. I remark as to No. I., that any direct mode of reaching our grammar schools is at present impossible. Any one who knows the state of the law as to charities, and the present condition of their places, of their governors, masters, friends, and pupils, will assent to what I say.

"But they can be touched incidentally, indirectly, by means of

No. III., by making new schools, and improving others, where the difficulties do not stand in the way that render the direct reformation of grammar schools at present impossible. The old schools will follow the example to some extent. No. II. is a good object. Much might be said on the mode of accomplishing it; but I leave that to you.

"No. IV. Books, maps, &c., are growing cheaper, and very much cheaper, than they were: Prove a demand for all these things, and you will get it supplied cheaper and better by the enterprise of individuals than by any efforts of any society.

"I hope you will accept what I have written as an evidence of my great respect for your useful Society, and my best wishes for its welfare.

"I remain, ever yours faithfully,
"GEORGE LONG.

"Edward Solly, Esq., F.R.S.,
"Society of Arts."

M.

[2424.]

From Dr. Mac Clelland, of Glasgow.

"I have duly received your circular of the 5th ult., and have felt great pleasure in the perusal of its contents. Your efforts have my warmest sympathy. For many years my attention has been directed to popular education, and to plans for making the institutions given of so comprehensive and catholic a character, as would avoid interference with any sect or party of theologians; but as, in the movement for untaxing corn, the landlords were the most obstinate defenders of the tax, so, in education, all reformers find the clergy the most determined opponents of all education not based on the special creed the sect may profess to which the clergyman belongs.

"In the movement you are making, you may not find yourself so much trammelled with denominations of theology, and more likelihood exists, therefore, of your success; but I have long had the feeling in my mind, that if a combined movement were made, such as you now advise, to obtain a system of education which would reach the *base* of society, and enable the poorest and lowest in the empire to be educated, and that the plan adopted was upon a catholic basis, the education for the better class of workmen and the middle class would follow, and the industrial training form a part of the whole scheme of education.

"Let the plan of Massachusetts be taken, or the Prussian, or the Irish plan, or the plan lately introduced into Upper Canada, or that of Switzerland, or the best portions of all combined, and let parliament determine that through the instrumentality of law, based on the views practically carried out in the above countries, a system shall be carried into every hamlet in the kingdom, which shall cause every child to be educated; and another generation would not pass

away before the face of society among the lower classes would be changed, raised, and improved.

"The points you ask advice upon I shall briefly answer seriatim.

"1. I cordially agree with your views under this head. Industrial training ought to be introduced into every school for the education of the middle class, and, indeed, also into those for the upper classes.

"2. If the mechanics' institutes throughout the country were partially endowed, the industrial training might be introduced with great propriety. At present all those I am acquainted with in Scotland are struggling for existence.

"Even Anderson's University, which was the parent mechanics' institute in Great Britain, is deep in debt—so much so that the managers have to charge the professors with rent for their rooms to pay interest. I have been a manager of this institution for many years, and can speak from experience, that, without endowment of some description or other, it would be in vain to attempt industrial instruction; but, with endowment, the grafting of that system of training could be effected in this, and all other mechanics' institutes.

"3. There is no form in education more needed among the middle classes than that alluded to under this head. Young men are trained to dead languages, to the usual course of mathematics, and to writing, and are sent into the world without a particle of knowledge of the air, earth, or water, by which they are surrounded; ignorant of chemistry, of the bones of their bodies or of the physiology of their frames, of the nature of wages, high and low prices, of the laws which govern supply and demand; in short, of every thing they ought to know to make men of them. A few pick up these views after becoming men, but the majority lapse into genteel ignorance.

"I should hail with delight the day when the schools of the middle classes were stript of the swaddling clothes which have clung to them since the middle ages.

"4. This follows as a matter of course; but I fear that, during the present generation at least, endowments will also be necessary.

"5. Highly necessary. The German and Swiss schools would afford many good hints and suggestions under this head.

"6. I have long been against place-taking and prize-giving, and have never seen in common schools any good end served by following such a system. The most talented boy seldom gets the rewards; and in many, whose constitutions are of a lymphatic character, their brains are not developed sufficiently and early to compete for prizes. The boys of sanguine, nervous, or bilious temperaments, with the perceptive faculties well developed, are sure to gain the prizes; though in after life the prize-takers are found to be much inferior to many of their other school companions.

"7. The examinations are of great importance, but, for the reasons expressed, I would omit the prizes.

"8. After a careful examination of the whole conduct, training, ability, and education of a boy, I think a certificate of merit would be of great consequence, and might form a substitute for the prizes. I cordially approve of such an arrangement.

"My time is so much occupied as to prevent me enlarging on the views we have long been advocating in this part of the island;

but, that you may be aware of the views entertained by a large section of progressive educational reformers on this question, I send you copies of some of our petitions, reported meetings, and lectures. These will give you an indication of our opinions.

"With my best wishes for your success in this truly national cause,

"I am," &c.

[2380.]

Mr. A. Mair, of Edinburgh, writes,—

"I cannot presume further than to state my firm conviction of the desirableness of Government complying with the wishes of a large body of the people to have secular schools established throughout the country, leaving it entirely to the parents or guardians of youth to train those for whom they are responsible in that form of religion from which they themselves have derived the greatest comfort. Doubtless, there might be a higher class than the mere secular (could we all be brought to think alike on the subject of religion); but seeing how bitter is the feeling of sects, I feel convinced, if we wish for the real improvement of the people, we must have secular schools established throughout the land; and then, having enlightened the young mind, having early taught the child to exercise his thinking powers, shall we be prepared to derive full benefit from the industrial instructions proposed by the Society of Arts.

"I should indeed rejoice to see a measure embracing the principle I have alluded to pressed on the Government, and I sincerely hope this may be the feeling of the Council of the Society of Arts."

[2877.]

Mr. Henry Mallett, of Nottingham, writes, —

"I beg to acknowledge your communication of 31st of January, and in reply to remark, that having read over the contents to several, both working mechanics and employers, but one feeling pervades the minds of all—that of approval of the plan proposed.

"On reading over the six suggestions thrown out in your prospectus, I could not but observe that the sixth called forth from each person a decided approval.

"We have in Nottingham a school of design, a mechanics' institute, and an artisans' library, but in none of them is there taught the elements of industrial instruction.

"My son, a youth about eighteen, who is likely to have charge of our factory, and has entered himself a student at the school of design to learn mechanical drawing, can only be taught the science in theory: books, and the teacher (who himself only understands the theoretical part) are the only facilities afforded. It is true, that, like some others, having thus obtained the theory, he can, with the

assistance of our workmen in our own smith shop, work out some of the principles taught. Yet, this cannot be comparable to what is proposed in the prospectus, viz. a practical training and knowledge of the principles of the sciences on which arts and trades are founded, so as to be able to guide the working artisan. I have found in my own past experience much of the want of this early scientific training, which would have saved much time, labour, and expense, had I possessed it in early life; and therefore feel interested in any movement which will accomplish so desirable an object.

"I should think the best appropriation of the surplus proceeds of the Great Exhibition, would be to devote it to such an object. I give this opinion as one of the successful competitors in Class 19.

"I should imagine that suggestion No. 2. would work well; and No. 3. in connexion with schools of design, where mechanical drawing is already taught theoretically, and where books are already supplied; in addition to which, maps, models, diagrams, and apparatus, together with a thoroughly competent master, could not fail to secure a great amount of beneficial results; and as there are already exhibitions periodically of drawings, with a few prizes, the whole of suggestion No. 6. might be carried out in conjunction with them, thereby throwing a considerable additional interest into the whole.

"I remain," &c.

[2566.]

Mr. J. J. Mechi, of Tiptree Hall, Kelvedon, Essex, writes,—

"I very heartily concur in all the propositions propounded in the circular just issued by the Society. This is a utilitarian age for the million, pregnant with comfort, and even luxury, for the many. This well-being owes its existence to science, as applied to the arts, &c.; great is the opportunity for its extension, under an improved system of instruction, which is much required.

"Take agriculture as a single instance. Were the minds of farmers and labourers expanded by a more enlightened system of education, we should no longer witness with pain the wonder and surprise that many of them exhibit in inspecting the ordinary workings of a farm steam-engine and its necessary accompaniments. One of my great difficulties here has been, the total want of familiarity with steam as an economic agricultural agent. The same want of knowledge causes a disbelief in the necessity for drainage, deep cultivation, irrigation, &c.

"In our large parish of 7000 acres, 15*l.* a year is the only amount collected for the instruction of 1200 people. I need hardly say, that it will scarcely pay a female instructress, much less the rent of a room. The result is a lamentable ignorance. There is no National or British school in our parish. Had one half as much science been applied to agriculture as to manufactures, happy would it have been for the moral, social, and physical condition of this country.

"Faithfully yours," &c.

[2649.]

From Mr. John Mercer, F.R.S., of Oakenshaw, Lancashire.

"Oakenshaw, Feb. 17. 1853.

"DEAR SIR,—Will you allow me to put down my remarks in my own way rather than follow the text of the circular; and as I am best acquainted with calico printing, they will chiefly relate to this art.

"The remarks of Edward Potter in his 'Letter to One of the Commissioners,' however applicable they may be to design in the lower and medium styles for home and foreign consumption, are not equally applicable to the chemical state of the calico print trade.

"For the preservation and benefit of the British arts and manufactures, you conceive that the masters, managers, and skilled class of workmen of these arts ought to be better instructed in the rational and scientific principles involved in them. I think you are quite right; many great authorities have thought the same. Chaptal, on the phrase 'practice is better than science,' remarks, 'but when it is required to solve any problem, to explain any phenomenon, or to discover any error in the complicated details of an operation, the mere artisan is at the end of his knowledge, is totally at a loss, and would derive the greatest advantage from the existence of the man of science. The most experienced artist without science will often meet with the discouraging alternation of success and disappointment.'

"Perhaps there is no one can confirm the above remarks as regards calico printing more than myself.

"When I became connected with calico printing in 1818, the only two calico print works possessing much chemical knowledge, were Thomson's of Clitheroe, and Hargreave's of Accrington. I had a little chemical knowledge; this being united with practice, gave us an advantage, and was attended with good fortune and success for many years (until the time of the death of our principal, John Fort, in 1842, when we began gradually to close the concern).

"Many of the higher print houses and manufacturing chemists have, from time to time, supplied themselves with young men to superintend the chemical and colouring department of their works, from the chemical schools of Scotland,—a few from London, but most from abroad. To enumerate these would be too tedious, I will only mention a few cases.

"Thomson's, of Clitheroe; Crum, Hummel, Playfair, Sieves.

"Thomas Hoyle and Sons; Graham, Jamieson, Thom.

"Simpson, of Accrington; Lovett, Neven, Wiesgerber, and about a dozen others from abroad, at present in Lancashire.

"America is in the same position. I have had an application some time, from a highly respectable print house there, to find them a person possessing sufficient scientific and practical knowledge to manage their works, salary, 400*l.* to 800*l.* per annum, with an excellent residence; but all such persons in this country are nearly indispensable in their present situations, and to tempt them away would be doing an injury to an English house, to benefit one in America. I believe they are now looking to France for one.

"In many of the print, bleach, and chemical works in Lancashire, much deficiency in chemical knowledge exists; hence, there is much more bad and spoiled work than there would be if the scientific principles of the processes and colouring were well understood; although as regards good, practical men, no place exceeds Lancashire; but in such varied processes, from the grey piece to the finished print, consisting of from one to two *score* of operations, in either of which the goods may be spoiled, it often requires both the science and experience of the clearest to keep all right, detect the cause of error, and at once to set all correct again.

"The present chemical schools are not well adapted for the sons of print-masters, managers, or colourmen. In the two or three years they can spare for such study, they ought to be instructed in that branch of chemistry immediately applicable to their future labours; such as a good knowledge of the substances used in their art, colouring matters, acids, alkalies, earths, oxides, &c., chemical affinity, the action of heat, air, oxygen, chlorine, &c. These simple first principles will be as much as they can learn well in two or three years. When a young man, after returning to the works, finds that instead of having studied these first principles, which are every thing to him, he has spent his time in studying the vegetable alkalies, ethyses, mythyses, &c., electricity, &c. &c., he brings both his chemistry and his chemical school into disrespect; what he has learnt being of no service in the arts of printing, &c.

"I do not understand abstract chemistry; many of the richest things in the arts will no doubt be brought from the discoveries in it; but the young man's time is limited; he must be instructed in such knowledge as he can apply at once, leaving to his future and higher progress the chances of discovering new applications.

"The majority of the managers and colourmen in the calico print trade being practical only, are jealous of, and offer such decided opposition to, the introduction of what they call 'chemical men,' that the master, who would have engaged them, considers it more prudent to give way, than get into collision with the heads of his works, particularly as the applicant would have no chance for supplying their place for at least a year or two. A strong case of this kind took place with a young man named Fletcher, from one of the London schools; I tried for him, and he tried various places, but all failed, either from opposition of manager or colourman. This young man was, in my estimation, one as likely to succeed, either at a print or chemical works, as any I ever talked with: he saw his error in not having, before he applied, directed his attention to that kind of knowledge, applicable to the art, or situation he sought to fill; he might then have had more of the master's influence in his favour.

"The young men who would find no opposition to their entering into the works are the sons of masters, managers, and colourmen; but they have no suitable school where they can obtain the instruction required to fit them for their future labours.

"It appears the time is near at hand when something should be done for the rising generation, in a scientific way, more than the common country schools supply; for in every town and village they

now have reading-rooms, mutual improvement society, and small mechanics' institutes, with their yearly tea, *soirée*, and speechifying.

"As regards giving prizes, is it not premature to think of this? and would they not come better from the bounty of friends and patrons?

"As to forming mechanics' institutes into colleges and schools, if this is attempted it should be done only in a few places, say, one at Birmingham, Manchester, Leeds, Sheffield, and Glasgow, with a central or parent school in London: these would be quite enough, and should take precedence; as to others, establish them only as the attendance of pupils and calls for them justify their establishment.

"Much of this long letter may be foreign to your inquiry; but if there be any 'good opinion' or views, you can sort it from the lumber. I shall be satisfied. "I am, dear Sir, yours, &c.

"JOHN MERCER."

[2142.]

Professor William Hallows Miller, F.R.S., &c., of Cambridge, writes, —

"In the creation of new institutions, or in effecting organic changes in old ones, it will be easy to introduce improvements which, if the opportunity be now neglected, cannot without extreme difficulty be afterwards done. I cannot too strongly urge the necessity of taking due precaution in starting your schemes for laying the foundation of the industrial or art education, by thoroughly teaching the elements of mathematics, especially geometry. I am aware that there will be great difficulty in doing this, on account of the strange jealousy of everything like science on the part of the so-called practical men in this country; men, who in their own best works, commit the most glaring blunders for want of a smattering of geometry and physics, and who hold that scientific acquirements are a bar to the possibility of gaining a knowledge of strength of materials, prices of earthwork, masonry, &c.; and who act upon that conviction by a discreditable compact to keep out of the practical profession all men possessing the requisite scientific preparation.

"An industrial or art school could not probably afford time for the study of the languages called classic: this great deficiency in an educational point of view might be in a great measure remedied by soundly teaching French and German, the direct uses of which, in addition to the intellectual training they afford, are most important. You should carefully avoid the error of teaching anything except languages and mathematics too soon; then might follow those natural sciences that demand no great exercise of any faculty but that of observation; and lastly, chemistry, as recommended by Mitscherlich in his preface, to which I beg to refer you.

"I am perplexed by the last head of your list of suggestions: —

"'The improvements of the endowed grammar schools, more especially of those which are not intimately connected with the universities.'

"Now I really do not know of any endowed grammar schools that

can be said to be intimately connected with the universities. I know of no connexion that is not so slight that, if it were severed, would be felt either in the school or in the university.

"This university suffers much from the necessity of occupying the first year of an under-graduate's course, in teaching that which might and ought to have been taught at school. If you can bring public opinion to bear upon the endowed grammar schools, including those which any person may suppose to be intimately connected with the university, so as to introduce into the school a proper teaching of the elements of mathematics and perhaps of physics, a very great benefit would be conferred on this university at least."

[2496.]

From Mr. Richard Mills, of Colton Hall, near Rugeley.

"Sir,—The object contemplated by the Council of the Society of Arts is worthy of the rising genius of this great nation; and the detailed synopsis by which it is proposed to carry that object through the different departments of its practical development appears to be extremely well fitted to accomplish the proposed end.

"The educational curriculum of our endowed grammar schools is not at all adapted to the general demands of the present age, and in a great majority of instances those endowments are enjoyed as mere sinecures. If a different description of machinery could be effectively brought to bear on those munificent institutions, they might afford employment for the application of a large amount of motive power in furtherance of the great principles of industrial education, without the slightest prejudice to the communication of such classical literature as might be necessary to prepare students for our universities, and thus open opportunities to the middle classes to obtain an education, if not strictly eleemosynary, yet on such terms and with such adaptations as might be suited to their position and prospects in the social economy.

"I think it is very desirable that mechanics' institutions should, when practicable, be converted into industrial colleges. In a few instances I have found that, although these institutes are professedly based on broad and comprehensive principles, irrespective of creed, peculiarities, or denominational distinctions, yet in their working economy, party policy has not unfrequently generated party feeling, and exerted a withering influence in proportion to the preponderance acquired. To steer an equidistant course between extremes so wide and interests so varied and conflicting, without calling forth antagonistic elements, requires a larger degree of political sagacity than is ordinarily vouchsafed to those on whom devolves the administration of their complicated affairs. In many large towns, mechanics' institutions have been rendered eminently useful. Several of the fine arts have been cultivated with great advantage by native artisans; but these exceptions render a wider extension of the rule very desirable, and their conversion in the manner proposed would be likely to provide for the widely extended exigence. The general scheme

laid down in your circular embraces a plan at once comprehensive, feasible, and of general application, though it may possibly require slight variations to meet advancing circumstances. I would respectfully suggest that, in all industrial colleges, periodical lectures should be delivered to the students, accompanied by such illustrative models, diagrams, &c., as might bring the several branches of artistic science taught in the colleges within the intellectual grasp of the student. I have invariably found lectures of great use in the inculcation of educational principles, whether mental or mechanical, and therefore am of opinion that they should constitute a leading element in every system of instruction, simply because substantial representations greatly assist the perceptive faculties in comprehending the nature and application of abstract theories. I am also of opinion that it would greatly tend to promote the scholastic objects and internal advantage of these industrial colleges, if libraries, on a self-supporting principle, were to be connected with each institute.

"A small number of books would serve as a nucleus, which, by a small quarterly subscription, might be gradually extended. I cordially adopt the sentiment of the circular, that the present time is peculiarly auspicious for pressing this great question on the Legislature.

"The World's Exhibition has shown what may be accomplished by artistic skill. The aspects of the times are bright with promise, and seem to indicate that we are on the way to some great and important reconstruction of the social state, in which our artisans, instead of cultivating sceptical debate and dialectical sophistry, will have available opportunities for emulating other European states in intellectual elevation and artistic skill; and especially in acquiring those great moral principles which form man's noblest character, and constitute his highest bliss."

[1949.]

Professor Henry Moseley, F.R.S., writes, —

"In answer to the circular you have addressed to me, I have only to express my hearty concurrence in the movement which the Society of Arts proposes to realise in favour of industrial education. The cause is one which I have advocated for many years.

"To the suggestions contained in the circular I have only this to add, that the formation of a normal school for the education of trade schoolmasters, and lecturers on applied science, appears to me one of the first steps to be taken. The schools might, if the public mind were favourable, be created in a day; but not the teachers; they must be prepared beforehand. My experience goes to show how easy it is to get men willing to undertake this office of the teacher, how difficult to get men competent to it.

"HENRY MOSELEY."

[2429.]

The Rev. Thomas Mozley writes as follows: —

"The Society of Arts, as is proper, only touches on some of the deficiencies in English education. There are others I think as much of, *e. g.* geography, history, poetry, and music (where there exists any taste for it), chemistry, natural history, botany, &c.; but I quite agree with you in the opinion, that every child, rich and poor, should be taught the elements of drawing, mathematics, and mechanics. I think these things can be learned, up to a certain extent, much earlier than is commonly supposed; and once learnt, they become imperishable acquisitions and the foundation of an indefinite progress.

"But, without supposing that there can be in many cases either the leisure or the call for such progress, the mere elements are of very great value. I must say that I think the general education of this country, though some of my friends think it flat heresy for me to say so, is simply *useless*. I have had some experience on the point, particularly as regards the education of the poor. I have lived in the metropolis, in country towns, and in rural districts. I have had a parish four years in Northamptonshire, and ten years in Wiltshire. I have made efforts, desultory and misdirected, perhaps, but at much cost and trouble to myself, for the bettering of the condition of the poor. I have resided in a dozen different counties; and I have everywhere found the English working man very helpless, very wanting in self-respect and proper principles. I know it is objected to such statements, 'Then why do we get on so well?' but unfortunately, as it seems to me, the moral and mental degradation of the masses seem to contribute to a certain aggregate material success.

"But I am not satisfied that we do get on so well altogether as that the state of English, and generally of British, society is a thing to be proud of.

"As to the particular means to be adopted for promoting the useful and industrial education recommended in your circular, there cannot be much difference of opinion about them. The eight desiderata you mention I quite agree with you about; and the Society can do much more than individuals. Indeed any parent is almost helpless when he tries to procure a certain addition to the vulgar routine of education for his children; for he has not time to teach them himself, and must avail himself of existing schools.

"The great absurdity of the existing education of the country is, that so few learn well the few things that they do learn: *e. g.* how few working boys and girls can say the Catechism, or answer questions from the Bible, at eighteen! and how few young gentlemen can write Latin prose and Greek iambics at twenty-two!

[2131.]

Mr. James Losh, of the Industrial Schools, Swinton, Manchester, thus writes,—

"I am glad to find that such an effort as the circular indicates is about to be made to place the education of the youth of this country generally upon a more healthy and profitable foundation than it has hitherto had.

"As one who has for many years practically taken great interest in this subject, I have long been convinced that there is a crying need for a fresh element of instruction to be introduced into our schools generally. The teaching, in most cases, has hitherto been in a certain sense too abstract, and plainly too remote from the everyday life and wants of the great masses of the people. Such a plan as your Society aims to establish, if accomplished, will superinduce an air of *reality* into the work of the schoolroom."

N.

[3179.]

From Mr. Robert Napier, of Glasgow.

"West Shandon.

"My dear Sir,—The subject I consider one of the greatest importance for the future prosperity of the country; it being my opinion that if we are to maintain the high position we now hold as a nation, our operatives, and artisans, &c. must not only be expert practical men, but, as indicated in the circular, ought to know and understand the principles on which manufacturing processes depend.

"In establishing and carrying out a comprehensive system of industrial education for the nation, I have no doubt many practical difficulties will be met with, and that modifications will require to be made. Still, in so far as I can judge, the plan suggested in the circular appears to meet the wants of the case.

"In a free country like Great Britain, where any man, by talent and persevering industry, has it in his power to attain a respectable position in society, I am delighted to find a movement is making in the right direction, to educate and improve the working classes, and thus be the means of elevating the character of the nation as a whole, and also enabling us successfully to compete with other nations in all that is worth competing for. Wishing the scheme full success,

"I am, dear Sir,

"Yours faithfully,

"R. Napier."

[3356.]

From Mr. James Nasmyth, of Patricroft, near Manchester.

"Of all the improvements in the means of extending education among the mass of the people, and which would most rapidly yield valuable moral as well as commercial results, would be the bringing of the endowed grammar schools of the country into full agreement with the *spirit* of the original foundation; that is, by applying their vast means, which have been so shamefully devoted to the personal aggrandisement of the so-called 'trustees,' to the true objects for which their ample means were originally intended, namely, as interpreted through the requirements of the present time, and such doubtless as the original founder would have specified, had he lived in these days. It is a sad blot on the character of the present time that such noble bequests are permitted to be so grossly diverted from the *spirit* and even from the *letter* of the original intention, which cannot but have the effect of deterring many wealthy and benevolent persons from bequeathing their fortunes to such noble purposes.

"Our grammar schools might be made, if their ample funds were faithfully administered, the glorious centres from whence would radiate the brightest beams of intelligence and excellence; by the sound education they might be made capable of supplying, sending forth talent and virtue made doubly valuable by good training, and which would fructify over the length and breadth of the land, and so in due season yield results of the highest character, and elevate the religious and moral standard of the population, as well as carry on commercial greatness to a height never to be attained by any other means.

"Our endowed grammar schools ought to be made the grand centres of industrial education. *The most ample means are latent in them;* all that is wanting is the determination on the part of the country to see that they are applied to their true and legitimate object.

"II. This is indeed highly desirable, and fortunately most practicable, by a careful substitution of *systematic* courses of lectures on appropriate subjects.

"It appears to me, that the chief cause of such institutions having failed to attain the results hoped for at their foundation, has been the system of desultory lectures. A dozen lectures consecutively given on any appropriate subject, would yield more positive and lasting good than a hundred of those clap-trap ad captandum exhibitions, which have tended to reduce the position of a mechanics' institution lecturer to the level of the showman, and degraded the character and usefulness of such institutions in the same proportion.

"I would refer to one noble exception, in the case of the Edinburgh School of Arts, which, by a steady adherence to the healthy system of courses of consecutive lectures on suitable subjects, and carried on from October to April, has yielded most noble results. This admirable institution has held on its steady course of usefulness from the year of its foundation, in 1824, to the present day, and has

yielded incalculable benefits to thousands. I may say that the Edinburgh School of Arts is the only true mechanics' institution in existence, and its high success has, undoubtedly, been the result of the steady adherence to the system of consecutive courses of lectures.

"But when lecturers cannot be afforded, much, very much, may be done by the free exhibition (in some well-lighted suitable room) of well-selected examples of whatever is really first-rate and excellent, in various branches of manufacture and design, such examples having appended to them brief but clearly printed descriptions, so as to direct attention to the points of excellence in the examples, whether such be a specimen of workmanship, or of design, or work of art, so as in this simple manner to establish a standard of true excellence in the eye and minds of the beholder. Ocular demonstration, aided in this way by appropriate description appended to each example, would form a perpetual lecture of the highest value, and would not fail to bring forth results in the practice of the workmen visiting such leisure-hour resort, as would tell most importantly on the advancement of the arts and manufactures of this country.

"I conceive it to have been in this way that the Great Exhibition must have produced the great and good results, which there can be no doubt it has done: and, as a means of improving the taste and knowledge of the working classes, I know of no more effective mode than this of presenting to their observation well-selected specimens of whatever is excellent in workmanship and design; such objects, with, as before said, printed descriptions appended to each, directing attention to the various points of their excellence, would produce the most gratifying results. The discoveries which would result among the visitors to such exhibitions or museums of manufacture and art, would perform the function of a lecturer to perfection, while the vast expense of any staff of lecturers would be avoided. I have more faith in what the *eye* can do for the improvement of taste, than what enters the *ear*.

"The shop windows of our towns are doing a vast deal of good in spreading good taste, and it is only required that we carry out the same. I hope to see the day when every town, great and small, will have its Crystal Palace or museum of art and manufacture. The exhibition of whatever is truly excellent and perfect in art and manufacture tends directly to improve the taste of the beholder, in forcing on his mind, through the *eye*, a standard of excellence and perfection.

"III. It would indeed be most desirable to establish such higher schools of industrial art and manufacture. It might not be practicable to teach branches of manufacture in such, but simply the principles.

"Were our grammar schools made the schools of elementary industrial instruction, and that the chief prizes consisted in the title to the admission into the higher schools of art and manufacture; this would not fail to yield admirable results in both ways, by exciting the most satisfactory emulation among the junior scholars, who would strive to gain the advantages of the higher schools; but you would in that way be certain that the pupils who were promoted to the benefits of the higher school were all choice intellects, most fit material to be worked

up to the highest pitch of usefulness, and who would in turn, no doubt, find their way to the head of many a great manufacturing establishment. Speaking from my own experience of working men, I am satisfied, that could we only pay more attention to educating the *eye* and bringing forth the often latent faculty of comparison, a most important benefit would result, not only to the workman but to the perfection of the manufactures of the country. Nine tenths of all the bad work and botches that occur in our own business of engineers and machine makers, results from the want of that mere power of comparison and '*correct eye*,' which is so rare amongst such class of workmen; not that the faculty is absent, it is only dormant, having never been cultivated or educated as it ought to be, of all faculties useful to a working man. The annoyance I meet with and the vexation and loss I encounter from the simple matter of crooked work, to be drilled into true, is beyond all conception to those who are not practically conversant with the very limited power of workmen in general in this respect. When a workman has a correct eye, his work is not only executed with far greater dispatch, by reason of not having incessantly to stop working, and occupy his time in looking if he is working correct or not; but where such work results from a mechanic with a correct eye, brought into action by reason of all the parts being in true and accurate relation to each other; all goes off smooth at once and is durable in proportion; and as I am satisfied that the faculty of comparison is latent in all, and in most capable of being developed by suitable teaching in youth, and knowing as I do its vast *commercial* value, I would most earnestly advise, in all our schools, especially in those for the education of the working classes, that much time and careful attention be devoted to the cultivation of this almost invaluable but at present totally neglected faculty. As soon as a boy is taught to be able to place a dot in the exact middle between two other dots, by the pure effort of the eye and by the exercise of comparison, we have given him a mighty hitch on to all that is excellent as a workman, be the department what it may. Now this simple lesson is most teachable ; and I cannot find words to convey to you how valuable that one acquirement would be, as it lies at the bottom of all that tends to what is excellent in construction and manipulation. The next important lesson would be the drawing one line, at right angles to another line, by the eye alone judging of the perfect equality of the angles on each side. The possession of this amount of correct eye would stamp every piece of work with such a degree of correctness and air of truth, as it is almost impossible for me to convey, in words, an adequate idea of the value and commercial importance. It is really distressing to see how totally neglected is the education of the eye in our schools as at present conducted.

"IV. Very desirable. Let such go with the 'Halls of Excellence' along with the specimens I have before alluded to, of all that is first-rate in workmanship and art, as far as can be had. But let us have our 'Halls of Excellence' as before referred to: such collections would work wonders in improving our working population. The Crystal Palace was a 'Hall of Excellence' in the highest sense.

"V. No good will ever be attained without such systematic courses of study, so far as real teaching is concerned.

"VI. This system would work wonders; it would give a vitality and energy to the schools such as would almost make them self-acting."

P.

[2712.]

Mr. H. L. Pattinson, of Newcastle-on-Tyne, writes:—

"I have well considered the circular of the Society of Arts, dated 31st ult., and I very much approve of the whole of it.

"One's eyes cannot be shut to the fact, that almost all manufacturing processes now depend more on intelligence and skill, rather than on locality; and most branches are becoming so highly developed, that some, and in many cases much, scientific knowledge is required for their successful pursuit. The oldest and most important manufacture, that of food-agriculture, cannot be carried on in future, profitably at least, without the aid of science; and certainly I hold with you, that the science should be placed within the reach of all. Every grammar-school in the country should impart some rudiments of practical science.

"But except the matter is taken up by Government in a liberal and enlightened way, the thing will not be done.

"I will say no more, except that I think every one of the propositions contained in the circular good, and, if acted upon, likely to produce the best results, if coupled with the conditions I have stated above, as of course they must be."

[2484.]

"Thoughts on Technical Instruction, in Parts of the Empire remote from London." By JOHN PHILLIPS, F.R.S., Assistant-Secretary to the British Association for the Advancement of Science.

"To insure for any system of instruction in the useful arts intelligent and sustained support, it is not enough that the plan should be adequate to the object proposed; we must take care that the administration be such as to harmonise with the cherished habits of *local self-government*, to which the inhabitants of Britain have been so long accustomed.

"What we desire to teach, it may not be strictly necessary now to define; and it is, perhaps, not desirable severely to limit. Experience will add to, if it should not retrench from, whatever scheme may now be proposed; but an originally wrong direction of the executive agencies is not easily set right. This is by no means a case for the maxim of Siéyes, '*Power from above, confidence from below.*' A

central power of direction cannot and will not be obeyed, without disadvantage; but a *centre of advice and instruction* will be respected. If, at the same time, it should be enabled to assist the deserving, and to confer honour on the successful student, it would act beneficially on the whole system of national industry.

"In respect of the things to be taught, we may, perhaps, separate at once a large variety of mechanically-repeated operations, which are performed only in a sort of partnership with the revolutions of an engine, to which the human hand is only a living appendage.

"The engine to which it is an appendage is full of parts in whose construction right principles are required. *These principles can be taught* and illustrated in schools of art; but the manual skill, and trustworthy experience, which earn wages, can only be learned by something like the old process of master and apprentice. So in the multiplied and ingenious trades by which metal, wood, glass, and stone are fashioned to a thousand useful ends, the *principles* which rule these arts can be taught in schools, without in the least interfering with the entirely separate process by which patient industry converts them to familiar *practice.*

"Now, in a great majority of instances, these principles, on which regular success and continual improvement depend, *are never taught to workmen;* in a large number of cases they are unknown to masters, and thus a great want remains to be satisfied in the industrial teaching of our country. Let any one who doubts this consult his carpenter, smith, or mathematical instrument maker, on a new arrangement of elastic framing; he will find, in regard to the strength of material, and the relations of lines of surfaces, an amount of ignorance fatal in the one case to stability, in the other to accuracy, in both to economy.

"*A little geometry* in the mind of the workman would save a great deal of money to his master.

"Among the circumstances of most importance which require new and enlarged technical instruction, may be mentioned the frequent *introduction of new materials* which characterise modern times. We must picture to ourselves, in the art of building, the successive ages when wood, stone, iron and glass were placed under the control of the architect. How different is the practical knowledge required for the successful adaptation of their materials! How different the skill of the mason which reared the ponderous strength of the temples in Egypt and Greece, from that which built the aspiring churches of Normandy and Sicily! Even yet the principles of construction in iron are but half disclosed by theory—but half realised in practice; while, in regard to glass, the Crystal Palace should teach us that society has entered on a new æra in the history of Art.

"So much of geometry as lies at the root of the harmony of proportion, governs the disposition, and determines the strength of materials, must be made a part of ordinary technical instruction. We must add a careful cultivation of the senses, especially in regard to forms and colours, and without which all else is vain,—a good general training of the mind to fit it for observing facts, combining ideas, and applying them to practice. How is all this to be done?

"*Stare super antiquas vias, et inde prospici* has been, and must ever be, the mode by which the triumph of education is gained, the state of society amended. If we look to the provinces, innumerable small combinations—'*Mechanics' Institutes*' and '*Libraries*,' '*Institutes for Popular Science and Literature*,' appear to testify that our industrial population has begun to feel the want, and to attempt the task of technical instruction.

"I think we ought to build on this foundation, and believe that we can do so with safety. Instead of founding new institutions, to be worked by methods unfamiliar to the provincial mind, let us respect the strength of associations which have sustained so long the cause of useful popular education; let us give a more systematic shape, and more direction, to the instruction which they communicate; let us not destroy, or weaken, their *general educational value;* but augment their utility by adding some fundamental teaching in geometry, the mechanics of construction, the principles of design, colouring and composition, the properties of material substances, the elements of chemistry and physics.

"*Next*, let us take steps to give life and effect to this teaching. Let there be provincial museums of art and industry, adorned with copies of selected paintings, sculptures, and models of great mechanical performances. Let there be annual examinations, appropriate rewards, and exhibitions to seats of higher instruction.

"*Let the management be, as now, local.* Let the committee, refreshed by annual changes of members, on a regular plan, be composed of all ranks of intelligent members. Let there be frequent communication with diligent and prudent inspectors, strictly accredited, and firmly controlled, by a central board, and charged with the duty of delivering careful periodical discourses open to the public.

"If for promising pupils there were opened some channel by which higher, if not the highest, steps of education could be attained; and if, besides, successful study should be signalised by medals or certificates of honour, the public patronage might be expected to follow good conduct, cultivated intellect, and skilful hands; and thus, *without deranging what is good*, we *should engraft on it what is better.*

"The central organisation which a system, and, indeed, *any system*, presupposes, can present no considerable difficulty."

[2791.]

Lieutenant-Colonel Portlock, F.R.S., F.G.S., of Woolwich, writes,—

"Sir,—In respect to your letter of the 5th, I think it a duty to reply to it, however small may be the amount of information in my power to contribute.

"First, then, I consider it of the utmost importance that every practical man should be acquainted with the principles which form the basis of his own particular business, or occupation. Let me illustrate his proposition in the following manner:—

"Long practice will give great power in manipulation; and hence,

in the Chinese and other Asiatics, a wonderful dexterity in carving; but can it be doubted that, with a more perfect knowledge of the principles of Art, they would have given to such works an exquisite beauty which would have made the mind overlook the mere delicacy of the work itself. In like manner, can any reasonable person consider that the grotesque figures connected with a Gothic building, have any necessary connection with the style, or that they would not have been replaced by forms and faces of angelic beauty, had the minds of their producers been imbued with the true principles of Beauty and Art.

"Again, a mechanist may work from habit with great skill; and, so long as he keeps in a prescribed course, seems to arrive as nearly as possible at perfection; but, let it be necessary to vary the form of parts of his work to suit them to some peculiar circumstances, and he is at a loss; or if he does attempt to move, very probably will in the wrong direction.

"Examples might be multiplied to any extent, and the reason why such examples are almost infinite is this, that instruction is either purely theoretical, or purely practical; and that, too, in institutions which are intended to combine the objects of both. The theoretical instruction being given as if it had no bearing on the practical; and the practical, as if it had no connection with the theoretical.

"It appears to me, therefore, necessary that a course of instruction intended to bear on practical professions, should at each step of theoretical deduction point out the practical results to which it leads; and, in like manner, that practical instruction should constantly keep up the connection with theoretical principles.

"How little advantage is sometimes derived from a considerable amount of mathematical instruction, merely because it has been given abstractedly, and not as a means towards a practical end.

"It seems, then, only right, in every college or school not intended to prepare pupils solely for the Church, law, or some similar object, that professors should be found able, and required to give them instruction in this combined theoretical and practical sense; and that the pupils should go from thence to the workshop, prepared to comprehend the scientific principles of the tools or machines, they are to work with: to know, in short, why and how they do this and that,—and hence to know, also, when it may be desirable to modify, or change them.

The mechanics' institutes might be made most important instruments towards this end, by connecting with them professors and museums. By museum, I here mean a repository of the various tools, instruments, machines, substances, &c., obtained from all countries, which enter into the particular trade or manufacture of any one district, varying, therefore, the museum with the district.

"I am sure the manufacturers would co-operate with the Government in establishing such institutions or colleges; and I am satisfied that the result of tuition under such favourable circumstances, would be an amazing progress in the beauty, and other sterling qualities, of our numerous commercial fabrics, and in the grandeur and fitness of our public works.

"When the public eye has become critically correct, and the public

mind soundly instructed, indifferent works will no longer pass current, as examples of beauty, or of power.

"And what multitudes of blunders will be avoided! what wasteful expenditure of money, of time, and of ingenuity, upon impracticable things!

"The principles I have here endeavoured to sketch out, I am most anxious to bring into the fullest practical application at the R. M. Academy; and to enable thereby every cadet to feel that even in the apparently most abstract portion of his studies he is acquiring the elements of practical instruction, and at the same time, when he is examining a machine, to see at a glance on what theoretical principle the function of each part depends.

"I fear that I shall have exhausted your patience on this matter; but in truth, I feel so warmly the importance of making theoretical and practical instruction go hand in hand together, if we wish to arrive at great results in the arts, in manufactures, in practical mechanics, in civil and military engineering, in artillery, or in agriculture, that I have been tempted on perhaps beyond due bounds.

"I shall be most happy to hear of successful progress in so excellent a design."

[1798.]

"Dinting Lodge, Glossop, Feb. 9. 1853.

"SIR,—In reply to your request for my opinion from the Industrial Instruction Committee of the Society of Arts, I fear I could not, without an explanation too lengthened for me to attempt, reply as I could wish to your inquiries. I am disposed to encourage to the fullest extent *general* education amongst all classes. I have for years past aided to a considerable extent the education of my own workpeople. I differ from the policy of attempting *industrial* education; that, I consider, ought to be left to private enterprise and individual interest: any other teaching I conceive will be unsound, forced, and at variance with a sound commercial policy and competition. Cheap materials, in paper, in newspapers or periodicals, will aid all education most materially; and will be made available more particularly by the working classes themselves, as affording them the best and readiest power of self education.

"I remain, Sir,
"Your most obedient servant,
"EDWARD POTTER.

"Edward Solly, Esq."

[2252.]

From the Rev. A. Bath Power, of Norwich.

"MY DEAR SIR,—I need scarcely tell you, how entirely the general views expressed accord with my own; and how heartily I sympathise

in the object of the present movement. I feel, indeed, much encouraged in my own local efforts by the support which this document is likely to afford to my undertakings in this department of education; it tends also to increase my desire for enlarged opportunities; and revives my hope that a field will ultimately be afforded, in which, with thoroughly congenial employment, I shall be able to assist the development of the principles it embodies.

"I quite agree in the views taken of the present position of our grammar schools, and (as you know) have been for some time endeavouring to improve the routine in the Norwich school.

"The importance of enlarging the sphere of instruction in our grammar and other schools can scarcely be exaggerated; its deficiency in reference to the present wants of the middle classes will only be denied by those who are wedded to the Greek and Latin routine of olden time. Although many thinking men are alive to this fact, and are earnestly seeking a remedy, it must not be forgotten that there is the mixture of an immense mass of prejudice to overcome; and such opposition may be expected to any attempt to legislate upon the subject, that success at present would be very doubtful. The opportunity of gradually working out a change by the influences which are usually most effective in producing social reforms remains; but then much valuable time in the interim is lost, and the least impression made, precisely where most needed, among stagnant communities, and in backward localities. I can well believe that Norwich, for example, would be long enough before any general effort was made to remedy the deficiency, unless it was urged onward by a stronger stimulus than the desire to be advancing proportionately with other places.

In reference to grammar schools, I think much might be effected if the Court of Chancery, in arranging schemes for schools which came under its authority, would sufficiently recognise the modern wants of society. The fact, on the contrary, is, that in several cases in which the routine has been directed by its orders within a recent date, no provision is made for that branch of education which is understood by the term "industrial." Mathematics and modern languages have been cared for, but the principles of physics remain totally neglected. This fact has come under my notice more prominently by my attention having been directed, in two cases, to institutions about to be revived, under orders of the Court of Chancery, which, however, I declined having anything to do with, as I was not satisfied with the course so directed.

"I would unhesitatingly undertake a college or institution, organised under good auspices, in which attention to modern science, as applicable to arts, manufactures, and daily life, were to be characteristic and primary objects, but I decline on principle the office of perpetuating the gigantic mistake in question.

"As relates to our popular institutions, I should rejoice in any measures calculated to impart more vigour and vitality to them; and could a system of certificates and prizes be devised under authority, to exclude all suspicion of favouritism and jobbing, much good might be effected.

"I can only say further, that I am prepared to co-operate in any

way that may be pointed out. I carry on my system of lectures for schools and families provisionally, but I am quite ready to modify my plan, or adopt any suggestion to make them more useful.

"I am about to take up, for this year, light, heat, and electricity, commencing with the latter as most convenient now. I shall endeavour to give these subjects a practical bearing."

R.

[2153.]

The Rev. Arthur Rigg, Head Master of the Training School at Chester, writes,—

"In answer to your request for such remarks as a perusal of the Circular on Industrial Instruction may suggest, I respectfully offer the following: —

"(Page 2. paragraph 1.) With every statement in this paragraph I cordially agree. I think, however, the Committee, in their anxiety to avoid one error, are likely to commit another, and to lose an opportunity of converting abstract theories into practical realities, which I am sure is not their wish. It seems to me, that there is a mean between the continental error, as described by Dr. Lyon Playfair (p. 32. of his Lectures on Industrial Instruction on the Continent), and the absence of all workshops.

"The Committee will not, I trust, think it presumption if I venture to offer suggestions which are the results of my own experience for the last thirteen years.

"I should be disposed then to encourage the establishment of workshops in connection with all schools or colleges for industrial instruction, if these were opened for the pupils during the hours now given to play and idleness, and if the same care and vigilance were exercised over them (the workshops), as are or ought to be over the lecture and class rooms. I have little doubt but that many would be drawn to these, as the places where they might obtain that relaxation now sought for by other and less profitable means. They would soon find that change of occupation was relaxation, and that to pass 'from the mental labour of the classes, to the muscular labour of the workshops,' would restore the tone and fitness for future study. I believe that, after a little experience, management, and arrangement, we should find the pupil practically studying the principles of his future craft, in a way more profitable than either lesson or lecture could supply. This would be the case with girls as well as boys, or women as well as men. I do hope that if the Committee are able to forward the question of legislation as regards Industrial Education, the case of females may not be overlooked. There are so many occupations in which females may be employed, that every legislative encouragement should be offered to induce them to study those principles which they might practically employ.

"I am quite ready to admit, that experience has induced me to

change and modify views once entertained, of the value and position of workshops, and to arrive at the conclusion, so clearly put in the paragraph which has induced these remarks.

"The improvement of *certain* of the grammar schools is proposed. With the present desire to put the Universities of Oxford and Cambridge upon a system more suited to the requirements of the age, it would not be difficult to get incorporated into any legislative enactment upon this question, such clauses as would give them power, or require them to recognise "Industrial Knowledge." This being done, the grammar and many private schools would recognise the importance of a branch of study now altogether neglected. To this day I quote as an instance of the unpractical character of my own university (Cambridge) the fact, that with so many young men pursuing the study of applied sciences, not one working mechanic of the class of philosophical instrument maker and optician could earn a livelihood. In 1834, one endeavoured to establish himself in a locality and style which gave every hope of success, but he was obliged to leave for want of support.

"2. And associating these when so converted with some industrial university. There are so many ways by which this may be done, that a little consideration would select the best.

"5. Unless the preparation of any legislative enactments under this head be remarkably well considered, and books, &c. provided (not under the authority of Government, but), strictly suited to the courses of study defined, and well adapted for educational use, a long time, even years, may elapse before the right adoption of the plans proposed. It would materially forward the views of the Committee, if this task could be at once commenced. The greatest possible care, however, will be needed in the selection of persons to do this, so few are competent to write educational works. As an example of what I mean, I may refer to Professor Willis's principles of mechanism; this book is more fitted for our universities than our schools. If the author would reduce his own work, and adapt it for school use, we should have a book infinitely better than those which are in reality a series of extracts from the "Principles of Mechanism," mixed up with articles which in strict language are foreign to the subject, as expressed in the words, "Principles of Mechanism." I name this, because, when books are published under the sanction of a society, too great care cannot be used lest the credit of the society be compromised by, not the ignorance, but the educational inexperience, of the writer.

"6, &c. The Committee of Council on Education have long had minutes of their records of aid towards industrial schools. With the exception of getting clothes washed, cattle fed, poultry reared, and vegetables planted, little has been done under these minutes. Perhaps the Committee on Industrial Instruction might be disposed to direct their attention to these minutes, and consider whether in this channel they might be able to advance, even in a small degree, the cause they have in hand.

"It might be worth consideration, whether it would not be well to reward the school, or schoolmaster, in the cases where scholars gained scholarships at the general examinations.

"Much more might be written, but I feel that already an apology is due, for so long a trespass upon the time of those who are interesting themselves in the promotion of an education so long needed, but hitherto so little demanded, and so little encouraged."

[2303.]

The Committee of the Mechanics' Institution at Ripon reply:—

"The committee of this institute attach a very high importance to your Circular; and they believe, if it be properly followed up, that the most important advantages will result from it, both to mechanics' institutions, and to the progress of adult education amongst the working classes.

"Government would confer a great boon upon the country by taking up this great question, and originating some general and comprehensive plan that would insure a full scope to the objects alluded to. Keeping up the present character of mechanics' institutions as self-supporting and self-governing, Government might introduce a system of aid to them, that would not in any way detract from these essentials. Amongst the chief agencies may be enumerated a central college in London, at which none but those who had passed through the classes of mechanics' and similar institutions should be admitted, with pecuniary support during their residence in London; to which it would be well to add prizes and scholarships, as well as certificates.

"Grants of money, properly applied, might be made to the country institutions, towards the building of suitable class rooms; and books, models, maps, &c., should be supplied, either free, or at a very moderate rate, leaving the annual subscriptions to be applied to the salaries of a superintendent, &c., or any treasurer that might be required."

S.

[3410.]

From Mr. Abel Schofield, of Saddleworth.

"Sir,—I have to acknowledge the receipt of yours, dated the 5th ult., and as I have no doubt you have had communications from parties whose experience and means of observation were greater than mine, I can only add my conviction of the propriety and desirableness of the means of cultivation to the industrial classes being more extensive than they have been hitherto,—indeed, in many places, they have almost yet to be begun.

"The tendency of the spirit of the times is undoubtedly to a more tasteful production of manufactures than has been hitherto, particularly amongst the middle and lower classes, but until this taste can be created more extensively than it is at present, a sufficient

demand cannot be found for articles in pure taste, and elegant and useful productions. While this is the case, it is too generally a source of loss rather than of profit to a manufacturer to produce articles new and good. The taste for the demand and the supply must, to make it answer the ends of any producer, be approaching to each other; and I do not think this can be better done than by giving every opportunity for the cultivation and study of the principles of the arts and sciences.

"I am the more inclined too to recommend the public in addition, if not in preference, to a private education and study of such principles, since I have found, nearly in every case of private exclusive study, a far greater degree of bigotry than in those of more public class instruction.

"I have therefore found that there are two serious obstructions to manufacturers extensively producing articles of taste and elegance at a reasonable cost, that is, a want of artisans to carry out their views without being overlooked in every minute detail; and secondly, of a certain demand for them.

"I have therefore, I believe, already given an opinion, in part at least, to the propositions contained in your Circular, but may add,—

"1st. The objects of most endowments being to instruct the inhabitants of the district in which these foundations are situated, would, I think, be equally as well carried out in preparing those for whom it is intended to render the main industrial elements of that neighbourhood more profitable and successful.

"2nd. The present mechanics' institutes are, or ought to be, schools of instruction in the principles of arts, manufactures, and science.

"3rd. As it is impossible, in the present state of human nature, for all to be equal, and as the duties of some must necessarily be to guide and provide for others, a more large and diffused education cannot be too highly attained.

"4th. and 5th. That every facility that can be obtained may be required for the effectual promotion of the objects intended.

"6th. That prizes and exhibitions are necessary incentives to many, while to none, am I aware, they can do real harm.

"These remarks, you will preceive, apply not merely to the industrial part of the community, but to others upon whose encouragement a considerable portion of the success depends; while the superior means of many of these, and the great facilities now existing, render them less excusable in not obtaining them.

"I have the honour to be, Sir," &c.

[2286.]

From the Rev. B. H. Kennedy, D.D., Head Master of the Royal Free Grammar School, Shrewsbury.

"Sir,—I have had the honour to receive your circular letter, addressing to me from the Industrial Instruction Committee of the

Society of Arts, certain questions respecting the advancement of industrial instruction in foundation-schools.

"The term 'industrial instruction' is somewhat large; but if, as for the present purpose I venture to suppose, you limit it to the theoretical and experimental teaching of natural science, together with the artistic use of the pencil and the pen, practical and ornamental, I cordially respond to the spirit and tenor of your communication.

"I need hardly say that mathematical science, as pursued at Cambridge, enters largely into the studies of Shrewsbury School. In proof of this, I may state that two gentlemen (Messrs. Day and Horne), who stand at the head of the First Class, third year, in St. John's College, are pupils of mine, and may fairly be expected to rank very high among the Wranglers of 1854. I have also been in the habit, for some years past, of providing one weekly lecture in natural science. The subjects so pursued, with the aid of maps, diagrams, models and experiments, have been physical geography, popular astronomy, mechanics and hydrostatics, chemistry and electricity. These lectures have generally been given by the masters themselves; but often I have availed myself of opportunities to introduce good professional lectures; as, for instance, Mr. Pepper in chemistry and its branches. These things I mention for the purpose of showing that I am neither unwilling, from want of congenial feeling, nor unable, from lack of experience, to meet your suggestions in a suitable spirit.

"I proceed then, at once, to answer according to my best judgment, the immediate practical question, What might be done by the Society of Arts (at this moment and under existing conditions) to promote industrial instruction in grammar schools?

"I. The Society might publish a volume, with some such title as this: "Instructions for the Use of Lecturers in Elementary Science." This book might describe the order and the range to be taken, by school lectures in each science, with the diagrams, implements and experiments to be employed, including a full list of such diagrams, implements and apparatus, with prices annexed. Whether the society would think proper also to recommend particular books for the study of lecturers is a delicate question, which I need not enter upon; but my feeling at present is, that this would be better omitted. An appendix might be subjoined, with directions, wherever needed, for the manipulative process in each experiment.

"II. The Society might provide the lecturing apparatus of every science, for sale to schools, at a cheap rate, packed in durable and convenient cases, separate for each science, and capable of being replenished in regard to such contents as are exhaustible or perishable.

"III. The Society might attach to its staff by honorary titles, and better still, if possible, by small salaries, a sufficient number of lecturers in various sciences, whose occasional services it might supply to schools, on terms to be agreed upon, every such school subscribing to the funds of the Society itself, as well as paying for the lectures given. This arrangement might involve some difficulty and trouble; but the benefit accruing would be great in proportion.

"These are the most important advantages which seem to me capable of being conferred upon foundation schools by such a body as the Society of Arts. More important still are those which a wise legislature and government might confer.

"The subject is too large to be discussed at full in the limits of my present letter, but I will venture to offer one or two observations respecting it.

"The first question seems to be, What are the difficulties opposed to the enlargement and improvement of instruction in foundation schools? and the next is, How can all or any of these difficulties be removed?

"The difficulties are both numerous and various; but I note the following as chief:

"(1.) The funds of foundation schools, and, to a greater or less extent, their government and direction, are in the hands of trustees, who (taking the kingdom throughout) include men of various tastes, feelings, opinions, acquirements, and abilities. From this state of things uniformity of principle and practice cannot possibly result. Central activity will frequently be checked by local resistance.

"It is evident that this evil can be corrected only by the establishment of a central power capable of overcoming such resistance. I mean, of course, by the creation of a ministry of public instruction, with a relation to educational institutions and authorities, analogous to that in which the Home Office stands to local functionaries of justice. By this central action great improvement would at once be made; and, with patience and discretion, uniform progress would be firmly secured.

"(2.) Most foundation schools could not be considerably utilised without larger funds to begin with. The central ministry might recommend parliamentary grants for building, salaries, exhibitions, prizes, as occasion required; and in such cases a portion of the school fees might be set apart for repayment.

"(3.) The efficiency of public 'grammar schools' is grievously impaired (I speak from painful experience, and I cannot speak too strongly), by the want of good and systematic preparatory instruction in this country. Of course, there are some good preparatory schools and some good private tutors. But, upon the average, children are very badly taught; and, in my experience, this is particularly the case in the great manufacturing districts. The mother, in general, has more to say in the choice of a preparatory school than the father; and she looks more to the physical comfort and domestic treatment of her child than to his prospect of mental improvement. The result is, that boys often come to a public school at the age of fourteen or fifteen, knowing very little Latin and no Greek; and without any other acquirements (except, perhaps, writing and cyphering), to atone for this deficiency. Such boys are a dead weight upon the emulative springs of the school, and too often they become troublesome to discipline, and of dangerous example.

"This evil may be remedied by attaching to every public grammar school (gymnasium), one or more preparatory schools (progymnasia), within easy reach, and to be visited and examined from time to time

by the principal master or masters of the higher school. For this purpose again grants might be made, with conditions of payment annexed.

"(4.) In the first part of this letter it will be seen that I speak of lectures only, without saying anything of lessons and examinations, without which attention to the matter of such lectures cannot be enforced, nor the retention thereof be ascertained. So given, lectures only furnish opportunities of acquiring knowledge, of which a boy may avail himself or not; and such opportunities will be used by some, according to ability or taste, and neglected by others. Can this be otherwise ordered? Let us see. Of boys sent to Shrewsbury School (and the case is much the same in grammar schools) the great majority are designed for one or other of our old universities. Their parents wish them to pursue that mixed classical and mathematical course of reading which will prepare them for university examinations. More than this; they wish them, if possible, to *excel* in one or other branch, or in both; to stand as high as possible at college; to gain prizes, scholarships, fellowships. For this specific purpose they are sent to school; and very many parents do not wish the minds of their children to be diverted from these objects to a variety of other studies. They would be glad to see them as well informed and accomplished as possible; but a good preparation for college is the immediate and most indispensable requisite. Speaking then for myself (and I am sure that most other masters would say the same thing), I ought not, under existing circumstances, to *oblige* boys who are designed for college to pursue studies which will not materially promote their interests there. I ought not to do this, because the first and most express purpose of the grammar school is to prepare for the university. But am I therefore to reject enlarged scientific instruction altogether? Assuredly not.

"In the first place I have already declared that I accept and adopt instruction by lectures for *all* boys. But I have something further and more important to say. I should wish to have in Shrewsbury School, and to see in every public school, a 'scientific and literary' department for boys not intended to proceed to college, as well as a 'classical and mathematical' department for boys so intended. And I believe that great good—local, national, and social—would arise from so combining in one school, with common religious teaching and free domestic intercourse, two (or it might even be three) departments of study.

"But for this purpose a new staff of masters would be required, and these I could not venture to engage on mere speculation, nor would the funds of the trust suffice for the purpose.

"Here again the central power might help us as before.

"(5.) Prizes and exhibitions, under wise regulation, are valuable helps in every department of education, and might very usefully be regulated where they exist, and added where they are deficient, by the same central agency.

"My time is now exhausted, though I could say much more. But if these suggestions (hastily penned, but long considered) shall induce your Committee to communicate with me hereafter, they may com-

mand at any time my earnest attention, and (I venture to hope) my zealous co-operation.

"I have the honour to be, Sir,
"Your most faithful servant,
"E. Solly, Esq." "Benj. H. Kennedy.

"*Postscript.*

"The trustees of Shrewsbury School have power to purchase educational apparatus, and I think they would gladly do so.

"I should be willing to have a weekly scientific lecture in thirty-two weeks of each year; the distribution of subjects remaining for consideration.

"I would attach to the nominal staff of the school such lectures in each science as the Society of Arts (for the present) might recommend.

"I would undertake to pay at the rate of one shilling each lecture for every boy paying school fees; and I think the trustees would make some payment for those who are entitled to gratuitous instruction. I would provide bed and board for the lecturers on the days of their attendance.

"Would it be possible, by the intervention of Government or otherwise, to arrange with railway companies for the cheaper transit of school lecturers from place to place?"

[2036.]

From Mr. Robert Angus Smith, of Manchester.

"I was much pleased with the Circular about Industrial Schools, &c. I had myself begun to speak of the matter here; desiring, however, to wait awhile, until we heard what the Government should say on the subject.

"With regard to proposition 1., the change in the grammar schools, I am anxious that this point should be kept in view, —

"*That these schools are most of them originally for the poor.* They now form an admirable basis for the education of those who cannot pay; and I hope that your plan does not sanction the continuance of the robbery so long practised, and which it is not strong language to call a national crime. The introduction of industrial education into them would be in direct accordance with the spirit of their founders, and they are already self-supporting.

"But, independent of these, and for the middle classes, and higher classes of commercial communities, another school is much wanted. This school I prefer to call *Polymathic.* It should of course teach all that a polytechnic or industrial school teaches, but must have teachers who shall educate youth as highly as they shall be fitted for. I had occasion to admire the Gewerbe and real schools of Germany, living as I did in intimacy both with teachers and pupils, and there I found men who were too much advanced to be at all compared with the teachers who guide the same class of children here. There, also, I found the children better taught. It is true these children were

intended for more than workmen in most cases, and of course some for the university, but the same thing cannot be attained here for any class whatever, and there is no reason why it should not be the same with a lower class still. I object to the name of industrial in most of these cases, as it gives a very exclusive idea, and it would seem as if we were rushing, to make up for a negligence, into an entirely mercantile system of education. As these schools will in time probably absorb the greater number of the population, I would propose the word Polymathic, as being free from a contracted ground-idea, and more in accordance with the wants of a true civilisation.

"The want of such an instruction in Manchester is a great loss; it must, of course be so elsewhere. Although living by machinery, there is no school where mechanics can be learnt; no place to learn descriptive machinery; no place where the history of manufactures or of manufacturing communities can be heard. There is no description of raw materials to be got anywhere; they are not supposed to be of consequence till they arrive at Liverpool docks.

"Geography, in an extended sense, cannot be learnt; it ought to include the history of all so-called modern and newly-found countries, with some knowledge of the land itself, and the inhabitants as a race of men. Commercial statistics and law are nowhere taught; they are picked up by the industrious from newspapers. The history of commercial communities is never referred to, and all their lessons are lost. All these things, besides the established sciences, and the usual branches of education, ought to be attainable in such a place as this. Unfortunately they cannot be learnt in England, except by careful study. No one has been appointed to systematise them for the community.

"Such an institution is wanted, but I would most strongly desire that it should not be built out of the grammar school funds. Many of these things can be learnt only by the rich or those who have leisure, and the poor must have all they can get from the old endowments. I would rather see this institution begun in a deserted mill, than that time should be lost in raising a building — which, if built at first, would decidedly not answer the purpose, which purpose will develop itself in time more fully. In No. 2., the conversion of the mechanics' schools into industrial colleges, I would propose industrial *schools*. In most places where they have succeeded, there are only boys and girls attending, and by an improved system of teaching, which is miserably wanting in some, they will form very efficient schools for the independent poor, who will not go to the grammar schools, and who may not be able to attend the full course of the polymathic institute. Many of the poor will be too proud to go to the grammar schools; the gentlemen are not too proud to send their sons.

"No. 3., an improved system, in all schools, will be a great advantage. Our system helps ignorance, because people fancy they have learnt when they have run the course; whereas, in the country generally, all the real knowledge is outside of it.

"In the other propositions I cordially agree; above all, cheap books. If books of reference, and text, and class books could be made on a good system, and sold at cost price, it would be a blessing to the country not to be calculated.

"The schools to be self-governed; I hope this does not exclude a mixture of teachers and laity in the council. I consider the introduction of the laity, and openness of all proceedings, to be requisite to keep up constant interest in the community. I could say much of the great expense of education in Manchester and some large towns, compared with other places, but I confine myself to the questions asked in the circular, as to the general character of industrial institutions wanted in the country."

[2471.]

From William Spence, V.P.R.S., &c.

"18. Lower Seymour Street, Portman Square.

"My dear Sir,—Fully concurring in the opinions expressed in the circular with which you have favoured me, as to the expediency of some plan for the industrial education of the people, being now pressed on the government and the legislature, and as to the general principles on which it should be carried out, I would merely suggest that instruction in the elements of natural history ought to be made a prominent object in any such plan.

"1. As furnishing one of the most effective modes of disciplining the young mind to habits of close observation and comparison;

"2. As laying up the source of an unfailing fund of mental recreation and enjoyment, and of bodily health in after life; and

"3. As being absolutely necessary to form the tastes of the great numbers of our middle and working classes, likely in future to be employed on designs for, and in making various articles of, ornamental manufactures.

"As the masters of schools are at present often as ignorant of natural history as their scholars, it seems to me that the only practical way in which this subject could be introduced into our common schools would be by means of competent lectures, giving in succession at stated times three or four popular lectures on the elements of natural history, adapted to the comprehension both of masters and scholars, and that the masters should then carry out the idea by the aid of short and simple introductory works, like Patterson's "Zoology for Schools" (as is now done in the Irish schools,) the scholar's proficiency in which might be examined and stimulated, from time to time, by periodical visists of the lecturers and additional lectures by them.

"I am," &c.

[2577.]

From F. Steiner, of Hyburn, near Accrington.

"If the elements of industrial instruction were taught in grammar schools, the present studies of the people would, to a certain extent,

be unfavourably interfered with, and the query would be, Where should the line for giving industrial instruction be drawn?

"The pupil, naturally inexperienced, could not fix upon the kind of industrial instruction he would require to be later useful to him, uncertain what kind of trade he might one day embrace.

"I think the present mechanics' institutions are prosperous, and work well in this locality. Were they to be converted into systematic industrial schools for artisans, they would not much benefit the industrous classes, for an artisan could not afford to send his son to a school for industrial instruction, and find him board and lodgings, when he might have an opportunity of binding him to an apprenticeship in a workshop, where not only could he see the newest processes carried on upon a large scale at his trade, but might also obtain good wages to maintain himself. Should a young man, under such circumstances, prove to possess a genius, he might easily find means to acquire the theoretical knowledge of his business. The most eminent mechanics of the day spring from the workshops.

"The establishment of a higher class of schools for those who are likely to have charge of manufacturing establishments presents great difficulties. An efficient manager has not only to know the practical part of every individual operation of his trade, but shrewdness, impartiality, and influence over men, are also as requisite: a manager possessing these qualities would prove more useful to an establishment than a theoretical, and even a practical, one deficient of them.

"The supplying, at reduced cost, of books, maps, and models, diagrams and apparatus, would be exceedingly useful to the people if such supply be afforded to the mechanics' institution.

"That systematic and defined courses of study be recommended. What I have stated before regarding the difficulties of applying industrial instruction to grammar schools and mechanics' institutions, present similar obstacles to this suggestion.

"The system of prizes may be harmlessly conferred upon a limited number of any sort of establishments; but if an attempt were made to apply the system to industrial excellence, where should the limit be fixed? To be consistent, the excellence of every trade should be rewarded. The rivalships in the school, in the workshop, and later interests, are sufficient stimulants to attain excellence in any department.

"Believing that the suggestions thrown out by your honourable Committee for consideration by the employers of the people would, if put in practice, not improve the present system of procuring industrial instruction by apprenticeship, and believing also that at present any kind of knowledge may be procured by the working classes, still I think the teaching of the principles of arts and sciences might not only be established more systematically, and rendered cheaper, but also more easily attainable by the people.

"The opening lecture rooms in the chief cities, gratis to the people, where systematic courses of lectures on the principles of arts and sciences be regularly delivered, and also illustrated, would immensely benefit all classes.

"These rooms might also be turned into a nursery for lectures to the mechanics' institutions; and if its members might have the privi-

lege of inviting lecturers to deliver discourses upon the principles of such arts and sciences as they desire, the greatest benefit would be conferred on these institutions, and the public at large."

T.

The Rev. W. Tennant, of St. Stephen's, Westminster, writes:—

"St. Stephen's, Westminster, March 8. 1853.

"I have pleasure in replying to the question which you addressed to me yesterday.

"Mr. Barlow, of the Royal Institution, with great kindness visits our boys' school every Wednesday afternoon at two o'clock, and spends one hour in giving a kind of catechetical lessons to about forty boys of the upper school.

"His instructions are partly mathematical and partly on matters connected with natural science.

"In Mathematics his talk is about fractions, decimals, logarithms, square and cube roots, &c., the axioms and first propositions of Euclid with illustrations and problems.

"Arithmetic is taught well in our school, and the little boys, who are much further advanced than is usual in Parish schools, are found to receive Mr. Barlow's communications with much intelligence.

"The latter part of the lesson relates to some of the wonders of the natural world. Many lessons have been given on steam and steam-engines.

"Fire, air, earth, and water have supplied subjects for remark. The several metals, &c.

"Last Wednesday the 2nd of March, the subjects were the calculation of interest (simple and compound) by means of decimals, followed by some remarks on the observation of the heavenly bodies by telescopes and the great consequence of small errors in calculating the position of objects so distant."

Sir Walter C. Trevelyan writes,—

"Athenæum, 17th February, 1853.

"All the suggestions of the Committee on Industrial Instruction mentioned in your letter of the 5th inst. are of great importance; but I should be inclined to add to the list of schools, National Schools, whether parochial or not, and Union District Schools, as some in which it is very desirable that the elements of industrial instruction should be given.

"As a preliminary measure towards some of the proposed changes, and one that seems, in the majority of places, to be almost indispensable for preparing the public mind for them, I would suggest that

public lectures should be given in all populous places, showing the necessity and advantages of these changes.

"With regard to the question of prizes, it seems to me doubtful whether any further prize is desirable, in the department of industrial instruction, than the very substantial one of the meritorious student or candidate succeeding in obtaining remunerative employment, which will probably be the aim of the greater number of the students in these branches.

"This class of studies is not like others alluded to, which often do not lead to remunerative employment, and which consequently require such additional incentives as prizes, to induce the continuation of those studies, which, however, in the case of industrial instruction is not necessary.

"I have suggested above that lectures should be given in all *populous* places; for I presume that it might take some time to get up a sufficient staff of persons competent to this duty; otherwise I should have said, in all places where an audience could be collected together —in the room of a philosophic or mechanics' institute, or a school-room fit for the purpose."

[2062.]

Mr. H. Stein Turrell, Vice President of the Brighton Mechanics' Institution, observes, —

"It would really be a boon to *private* schools to be supplied with their things at a reduced rate; and when the vast number of pupils educated in private schools is taken into account, it will be seen that the objects of the Committee could be more fully obtained by admitting private schools to this privilege than by relieving endowed schools. There is one class of schools eminently suited for the operations of the Committee, and which the suggestions altogether pass over: I mean National and British Schools. In these the industrial element assuredly might be introduced, if anywhere. It would, in my humble opinion, prove the greatest improvement of which these schools are susceptible, and would most materially tend to elevate the moral tone of the community.

"In the other suggestions emanating from the Committee, I see much to approve of, and, so far as I comprehend their scope, nothing to condemn."

[2397.]

The Secretary of the Tyldesley Mechanics' Institution writes,—

"I would suggest that any improved plan of instruction offered to mechanics' institutions should have amusement combined with it. It should be borne in mind, that in Lancashire a large proportion of those for whose benefit mechanics' institutions were in-

tended, are engaged in cotton manufactories, cotton mills, machine-shops, and other workshops in connection with this branch of trade. The air breathed in these workshops is kept at a high temperature (especially in cotton mills, being on an average about 80°), and is much vitiated in winter by one-third part of the time the work being done by gas light, which tends to depress the energy of body; and often, when the day's work is finished, the mind is indisposed to engage in study or reading. At such times men require relaxation and amusement, and they will have it: if it be not of an improving and elevating kind, such as lectures, music, chess, &c., it will be of an opposite character, vicious and degrading, such as may be found in beer and low public houses.

"Hoping your Committee will be able to offer a course of instruction to these institutions that may render them more attractive and more efficient than they have hitherto been,

"I am, Sir," &c.

[2032.]

Dr. John Tyndall, F.R.S., of Queenwood College, near Stockbridge, Hants, writes,—

"In wishing success to the undertaking in which you are engaged, I express the feeling of every individual who would like to see England rescued from a position which has long been a reproach to her. The committee of industrial instruction is the outward and visible indication of a great public want,—of a want which will assuredly find less pleasant means of utterance by and by, if it be not met and satisfied in time. No right-minded man, acquainted with the present state of things, can, I think, help wishing you 'God speed' in the prosecution of your first suggestion; and the manifest tendency of the others is, to transform the present chaotic education of England into something organic.

"You have a heavy work before you; but so good a cause was never intended to fail, if its supporters be only faithful and resolute. The results of such a movement are incalculable; among other things it would abolish the unnatural divorce at present existing between the cultivation of science and the practical man; the former would learn that every practical realisation of a thought furnishes a purchase for new speculative effort, while the latter would learn how society would be his 'practice' had it never possessed a scientific base.

"Again, I wish you success in your noble and necessary vocation. I wish you faith in yourselves, and in the goodness of your cause; for if this faith be kept glowing, no obstacle that ignorance or prejudice can erect against you will hold you back; and a future England will, I trust, look with gratitude on the men who took the precise step necessary to the preservation of her greatness; who, mindful of the tendencies and achievements of their age, resolved to supply it with an intellectual food suited to its needs and capabilities."

W.

[2352.]

From the Secretary of the Mechanics' Institution, Warrington.

"The Directors have a growing conviction of the great importance of *class teaching*, and have paid considerable attention thereto. They believe that working-men generally are not as yet sufficiently educated to profit by lectures; and that the instruction must therefore begin at a lower point—that the class-room must prepare the way for the lecture-room.

"But even *class teaching* has its difficulties. 1st. Our subscription is so low that we cannot afford to pay teachers, and are dependent on gratuitous aid, which fact circumscribes the ground possible to be occupied, and takes the classes to a great extent out of the control of the Directors. 2nd. If even able to pay for the best instruction, in towns of this size it cannot generally be obtained. 3rd. If both funds and teachers were at command, local managers are too unskilled in matters of this sort, to secure all the results that ample funds and good teachers might produce.

"We clearly require then, 1st. A preliminary grant in aid. 2nd, Resources for the obtaining of teachers. 3rd, A centre in which shall be procured the power to systemise and govern, or inspect, in conjunction with the local committee.

"The supply of maps, models, diagrams, and apparatus at a cheap rate, would be invaluable as an adjunct to some such system as the above, and would aid considerably even the very lame and imperfect class teaching already in existence.

"Prizes and scholarships, or even certificates of merit, would be useless here, without the systematic and thorough instruction which only well-conducted classes can supply."

[2164.]

The Directors of the Athenæum, Warwick,—

"Mainly coincide with the views of the Instruction Committee—they think that much good might be done by the Society supplying at a cheap rate maps, models, diagrams, and apparatus—still the great practical difficulty in towns of this character is the obtaining of efficient masters, and the payment of them when secured; the parties, for whose benefit the classes are instituted, being unable to pay any additional subscription, and the Society not able to bear the whole expense.

"In this borough there is a grammar school, maintained out of certain charity funds, called 'Henry VIII.'s Estate,' and which has for a number of years been administered under orders of the Court of Chancery. If a scheme could be devised for engrafting industrial instruction upon the present school system, and power given by parliament, or otherwise, to the Masters in Chancery, on petition to

direct a certain sum to be paid to an additional well-qualified master, much good would, they think, result by getting rid of the difficulty of payment by pupils, and also by materially increasing the number of boys frequenting school.

"They think it will be found that a number of schools are in a similar position to theirs, although they may not, as here, have a surplus or specific fund, to resort to; but if not, they think it possible, the parents would be glad to pay an extra fee for the advantage of industrial instruction."

[1908.]

From the Rev. Herbert Hill, M. A., Head Master of the King's School, Warwick.

"I have been considering the subject, and conversing with several gentlemen in this town, parents of boys, or otherwise likely to be interested. The general impression seems to be that it would be of great utility for the middle classes, sons of tradesmen, professional gentlemen, and others of the like position (among whom my lot is cast), to have the means within their reach of a really scientific training, or at least initiation in such branches of education as you seem to allude to. This is also certainly my own view, and I can see that it is perfectly possible for much good to be done by 'supplying at a cheap rate maps, models, &c.,' by extending assistance and valuable direction to those who are inclined to exert themselves; perhaps also by accrediting teachers.

"But the other question which your letter opens, does not admit, I think, of so satisfactory an answer. Supposing we, the masters of foundation schools, are willing or glad that a certain portion of time should be devoted to drawing, which is done, I do not doubt, in many schools, then where are the funds for a drawing-master to come from? The income of foundation schools, although in the aggregate considerable, yet in almost every individual case is very small (as may be seen by reference to the books which give the statistics), and is really not adequate to pay the existing masters; besides which, in most instances there is no power of expending, no available fund beyond that which is at present used. There are very few trusts in the same condition as the Bedford or the Birmingham School Trusts.

"I doubt, therefore, very much, whether it will be found possible, even if such a measure were approved, to frame any measure applicable to endowed schools generally, although from time to time some of them might gladly and thankfully receive your assistance."

[2616.]

From Mr. John Waterhouse, of Wellhead, Halifax.

"I. I think the funds originally appropriated for the instruction of children in grammar and its uses ought not to be interfered

with, though fresh funds may doubtless be advantageously appropriated for instruction in other subjects, to be superadded to the original foundation, which would extend the usefulness of the present grammar school without material additional cost.

"II. It is impossible togiv e an opinion upon this proposition until the principles of such establishments are fully propounded. It must be remembered, however, that mechanics' institutes are supposed to be chiefly useful to the working-classes, during their non-working hours, and this appears scarcely compatible with the system of a collegiate institution. I cannot pass this question by without remarking, that, so far as my own knowledge goes, I believe the management of mechanics' institutions to be anything but satisfactory. In *very many* cases they are made political tools, and the attendance of nine-tenths of the members is only secured by a large supply of the newspapers and periodical publications of the day; a principle to be most severely deprecated, as slightly educated men invariably seize upon the most violent publications of the day within their reach, of whichever side it may be, and cannot be expected to possess that kind of discrimination which is required to glean the really sound information or opinions which such publications may occasionally contain. In the abstract, I have no right to object to a mechanics' news-room; but I do not admit that either the state, or a private individual, can be called upon to support such establishments.

"I have withdrawn my own name from the list of subscribers to the institute here (of which I have been a member for nearly thirty years, having during that period filled most of its offices, besides being many years president), disgusted with such misappropriation of its funds, destined for the really useful instruction of the labouring classes, and not to be used for the purpose of rooting out any inclination for rational inquiry which may have existed, by supplying them with masses of exciting and incendiary trash, more destructive, if possible, to the power and habit of useful application in the mind, than even novel reading; to say nothing of the social and moral dangers to society thence arising.

"III. The provision of books, maps, &c. would be a most valuable boon, but the Government cannot be expected to supply these, or funds to purchase them, unless the institutions so benefited be placed effectively under state supervision; certainly not to societies which, whatever they may be called, are virtually fast descending into mere news-rooms.

"IV. That systematic courses of study be *recommended* is very advisable; but if attendance on the part of the working-man is to be voluntary, as it ever must to be useful, and also at the *cost* of time and money to himself, encouragement must be given to him, by allowing him to pursue such subjects as, in his own judgment, are likely to be of the greatest interest or benefit to himself."

[2418.]

From Mr. Hewett C. Watson, of Thames Ditton, in his letter to the Committee.

"Any schoolmaster would laugh at a proposal to improve the senses of sight and sound, by diligently exercising children in the touching and tasting of objects. Yet the same man will usually fail to perceive, that training the single mental faculty of language or speech is not training the other mental faculties also; that it is not a general training of the mind, but only a very partial training of one of its various faculties. He sets a pupil to learn words and sentences by rote, to write and translate, and imagines that he thereby exercises the pupil's memory, not only memory for words, but memory for any thing or every thing else; while in truth he is thereby exercising and improving, not the child's memory in general, but only one of its several *memories*.

"Most strange, indeed, it is that an assumption so thoroughly false, and so decidedly contradicted by every-day experience, should still sway the educational practices of ninety-nine in the hundred teachers! In actual life, in society, we see that men are poets, painters, philosophers, musicians, chemists, &c., as often as they are linguists, orators, or writers; and that a decided talent for one of such pursuits, so far from always implying equal talent for the others, is very frequently accompanied by a positive unfitness for other pursuits of a different character from the one or two excelled in. Yet how usually do the teachers of youth fail to show any practical recognition of the true cause and explanation of these familiar facts, viz. that all such special tastes and capacities do result, from the varied combinations and proportions of the different natural faculties of the human mind; that they are as certainly formed by different combinations of these mental elements, as the names themselves are formed by different combinations of letters!

"The legislative institution of model seminaries or colleges, not following the old and inefficient routine, but really starting with improved methods and sounder views, would seem justifiable and desirable. But even these institutions should be made self-supporting if possible. And it would also seem both desirable and judicious, to establish a Board of Examiners, without whose certificate of fitness no person should in future be appointed to any public educational office.

"I. Better examples being set elsewhere, the improvement of endowed grammar schools might be left to their own patrons, or managers, at first. If they were compelled by law to select their masters and teachers from among those who had acquired a certificate of fitness from a constituted board, the needful internal improvements would naturally and inevitably eventuate by degrees.

"II. The conversion of mechanics' institutions into industrial colleges would probably be advantageous. A successful example or two would soon be generally followed; but the examples must be entirely spontaneous, free, and self-originating, not compulsory.

"III. Better instruction in proprietary schools and colleges would necessarily advance with the desire, on the part of the public, for an

improved education ; that desire to be brought about in the manner before suggested.

"IV. Most important aids in education, no doubt, are maps and models, diagrams and apparatus; but the public purse could hardly be opened for these adjuvants, unless in the model institutions before suggested. The want of such aids must call for its own alleviation elsewhere, the demand create the supply."

[2362.]

From the Committee of the Mechanics' Institute, Whitehaven.

"The Committee conceive that the operation of this instruction should be of two kinds, in local and central schools: that the former should be for both classes of students in the first instance, and for those who will receive in them knowledge that they can apply daily, and on the spot. The central schools of art should consist of exhibitioners from the local schools of two classes: —

"1st, those of the highest merit, receiving instruction gratis; and 2ndly, those of merit, partly free. And in order to facilitate the progress of these, none should be admitted unless from local schools of a fair degree of proficiency. The students of the central schools should be subject to public examination, and compete for certificates of merit; this would develope talent, and secure it a position in the national estimation.

"In giving their ideas of a local school of practical art, the Committee cannot but allude to the objects for which mechanics' institutes were first founded, viz., the diffusion of knowledge in the abstract principles of science and art, as connected with, and involved in, the realities of industry. It may be unnecessary to go into the causes of the dormant state into which this department of their usefulness has fallen, but the Committee are convinced that the time for profiting by past experience for reviving and improving this momentous branch of popular education has come, and that it need not again fall into obscurity, if made a national object and carried out by national means.

"The Committee beg to state briefly the mode in which these schools might be attached to mechanics' institutes, literary institutes, or other associations of the same kind, in towns where they exist.

"A commission or central council should be appointed by Government, or some other authoritative source, to administer the grants, assign competent teachers, and inspecting examiners; that these should act in conjunction with the managing body of the institute.

"The schools should be maintained partly by national funds, the grants of which should be subject to circumstances guaranteeing the permanence, free action, and efficiency of the departments assisted. These regulations might be suggested by the minutes of the Committee of Council on Education, enforced with reference to elementary schools. The remaining funds should be supplied by the fees of the students.

"The books, apparatus, &c. should be selected by the directing

council, and should be supplied at a cheap rate; from time to time new works and inventions might be examined, and recommended by the same body.

"The Committee are of opinion, that the elementary parts of study should be general, and the course of training dictated by the directing council; but in a more advanced stage, the specialities of a district should be regarded: thus, in West Cumberland the departments of mining and quarrying, pottery and chemical manufactures, ship-building, &c., would receive immediate and perceptible benefit, from the art-education of those engaged in them.

"The institutes, library, and museum would be valuable adjuncts to the system, and would furnish another reason, if any were needed, for attaching a department of this kind to mechanics' institutes.

"These are the leading ideas which the Committee have in view, in *pledging themselves to promote to their utmost any movement having a tendency to promote education in the principles of art as associated with practical utility.*

"They do not advance them as a particular crotchet, nor refuse to enter into any plan, by whomsoever originated, with the same purpose, but with a view to the improvement of institutions similar to that which they at present direct, and raising the mental, and almost consequently moral, standard of their countrymen."

[2381.]

From Mr. W. M. Williams, Master of the Secular School, Surgeon Square, Edinburgh.

"Sir,—I received your circular a few days since; and having been, during the last few years, engaged in conducting a school for children of the working-classes, which differs considerably from the generality of such schools—its distinctive character being, that particular prominence is given to the kind of education which is recommended in your circular,—I beg to offer the following suggestions relating to that part of the work in which I am engaged, viz. the elementary schools for children, premising that I confine myself to such as are founded on practical experience.

"One of the principal obstacles which stand in the way of carrying out this kind of instruction, is the want of suitable text-books, diagrams, illustration specimens, models, and apparatus. There are plenty of scientific treatises intended as school class-books; but scarcely any of them are at all fitted for the purpose, on account of their want of practical character. They are written in accordance with the old scholastic university idea, that science is something to be learned as a high intellectual accomplishment, and there to stop. Take the treatises in 'Chambers' Educational Course,' for example: they are very good of their kind, but are not of the kind required. A boy might be taught all that these contain, and understand it well; but yet have no adequate idea, that all the physical advantages of modern civilisation, the comforts, luxuries, and general wealth he sees around him, have been produced solely by the skilful application of

the principles he has been studying. On the contrary, he would, in all probability, look upon science as the majority of both learned and unlearned, even of the present day, still do, as something which has its special residence in universities, behind lecture-tables, and among the glass and brass apparatus in the philosophical instrument maker's shop. The idea of its absolute and common-place universality, and its direct applicability to the guidance of every art that human beings are capable of performing, is scarcely suggested at all by such treatises.

"Then again these are mere books, letter-press and a few wood-cuts. Such treatises are commonly considered by the publishers and the public as complete, but the teacher does not find them so; he requires diagrams, models, and apparatus. And these are more imperatively required than the text-book, for he may supply the matter of that verbally.

"I think, therefore, that you may do very great service by acting upon the suggestion, No. 4., in your prospectus. In order to do it efficiently, it is necessary that text-books be published, in which the scientific principles upon which the various branches of industry are founded, shall be expounded and illustrated by abundant references to processes in which they are employed, the most familiar and commonplace examples being selected. Every text-book should be accompanied: 1st, by an ample set of diagrams, large enough to be seen by a class of from fifty to one hundred children; 2nd, by a cabinet of objects, including specimens of the raw materials and the manufactured products referred to in the text-book, in their different stages of preparation and manufacture, of the tools used, or models of them when too large; 3rd, models of the machinery referred to; and 4th, an apparatus for experimentally illustrating the principles expounded.

"It is of the greatest importance that the text-books, diagrams, objects, models, and apparatus *be all adapted to each other*, and arranged in compact and complete sets; every thing substantially packed, labelled with name and number, and the place in which it is packed to be also labelled with name and number; and so packed and arranged, that every thing may be easily taken from its place and put back again. I mention these details, knowing them to be of the greatest importance and liable to be overlooked. I have seen collections of specimens, &c. put into flimsy cardboard trays, and stuffed into packing-cases with tow or wadding; and from a disinclination to throw away these trays, &c., they have been used in this state, and have speedily fallen into confusion, some lost, and the rest rendered almost useless from the difficulty of finding them at the moment when wanted.

"These treatises, &c. should not be arranged under the head of different trades or classes of industrial processes, but upon a scientific basis; the industrial illustrations being used to exemplify the principles expounded. The reason of this is obvious; as the children in the elementary school are not engaged in particular trades, and require, not technical, but general information—not minute details, but great general principles.

"In the purely industrial college for apprentices and workmen, of

course the minute details would be attended to; and the basis of the classification of the subjects would probably be technical.

"These sets of illustrations need not be so expensive as they at first sight might appear likely to be, as they could be selected with special reference to economy and portability.

"Suppose, as an example, the subject to be the general properties of the metals; the processes connected with the manufacture of such articles as steel pens, needles, pins, buttons, &c. would serve as well to illustrate them as those employed in the manufacture of steam engines; and the same specimens would serve over again to illustrate some of the distinctive properties of particular metals when these came to be described.

"Simple and cheap as such objects are, it is exceedingly difficult for teachers to obtain them (that is, in their various stages of manufacture). A society in communication with manufacturers, might obtain a hundred sets more easily, and almost as cheap, as a teacher could obtain a single series.

"It is probable that the demand for such things would be small at first; but a few schools furnished with materials of this kind, would by competition soon compel their neighbours to get the same. This has been shown here; for since the secular school has been established in Edinburgh, scientific teaching has been greatly extended among the neighbouring schools.

"Might not the Society of Arts itself afford such aid immediately?

"The National Society, the Christian Knowledge Society, and others have established repositories and agencies, and supply diagrams, books &c. in their departments, and, I believe, cover their expenses, by the sale of them to the public (deducting, of course, those they give to their own schools).

"It is evident that the success of any great movement for the industrial instruction of apprentices and workmen, must depend mainly upon their preparation for such in school. At present the great bulk of artisans are so totally ignorant of science, that they cannot perceive the relation it bears to their trades, and until they can understand this tolerably well (for which a certain amount of elementary knowledge is necessary), they will not seek instruction and pay for it, and otherwise self-supporting industrial colleges cannot succeed.

"Therefore, I think that no time should be lost in affording this kind of assistance to elementary schools; and if the Government does not do it immediately, the Society of Arts might.

"Supposing that the Government should undertake it, I have little doubt, that in most instances more good might be done with a limited educational revenue, by supplying either gratuitously, or at a reduced cost, such books and materials, than by merely giving grants of money.

"One of the collateral advantages of affording this kind of instruction to children would be the means afforded to them of selecting a trade suited to their natural capacities. At present, owing to the ignorance of both parents and children, this is usually little better than a lottery. In confirmation of this I may mention, that some of the boys at my school have become engineers in consequence of working the problems in 'Tate's Exercises in Mechanics' (a work which must be excepted from the objections I have made to existing school

books). This work is very popular among boys who have a natural genius for mechanical pursuits. They frequently ask as a favour, to be allowed to borrow the book, and work problems at home in the evenings.

"The natural interest which boys take in manufacturing processes is strikingly shown by our 'Question Book.' This is a book in which the children write questions, addressed to the teacher, on any subject they please. These questions form the subjects of a lesson, to the class from which they came, once a week. (See 'First Annual Report' page 8.).

"The class of questions which is by far the most abundant, are such as 'How is varnish made?' 'How do they stain glass?' 'How are gas-pipes made?' 'How do they make magnifying-glasses?' 'Please, Sir, explain to us the process of enamelling,' &c. &c. Although I served a full apprenticeship in a workshop where a variety of metal and other work was done, I have found it very difficult to answer these questions, the books containing the requisite information being difficult to obtain, and generally very elaborate, while general information is what I require. Teachers who have received a purely literary education, would be utterly confounded with such questions. As the education of a great majority of teachers has been of this literary character, they require much assistance to enable them to prepare children for industrial usefulness.

"Besides these text-books on the principles of the sciences illustrated by manufacturing process, there is another set of manuals much needed in schools and coming directly within the province of the Society of Arts; that is, outlines of the kind of duties which men in different trades have to perform, and the qualities and attainments required, and kind of training desirable for particular classes of workmen. For common school purposes, these would require to be concise and general, but sufficiently explicit to guide the child in selecting a trade, and enable it, from an early age, to contemplate seriously and ambitiously the duties and responsibilities of its future career.

"Mr. W. Ellis's manuals on social economy supply this as far as the general relations of capitalist, labourer, producer, and distributor, &c., are concerned; but the subject is of such great importance, that more detailed illustrations of these great principles, in their applications to different trades, might be supplied with great advantage, and children would give willing and earnest attention to such subjects, for they are in the habit of reflecting much more seriously than many adults suppose, on their future occupations and prospects in life.

"In reference to your second suggestion, I think that one of the greatest difficulties to be encountered is that arising from the want of systematic preliminary education.

"I was more than twelve years an active member of the London Mechanics' Institution, in Southampton Buildings, having been a pupil in most of the classes, a teacher in several of them, and during four or five years one of the General Committee of Managers,—and have observed throughout, that this want of some definite starting-point was a most serious practical obstacle to the efficiency of the Institution, and gave a desultory unsystematic character to all its arrangements.

"I am of opinion therefore, that your suggestions Nos. 5, 6, 7, 8, might, in connection with what I have already stated, be applied to elementary schools. When once such a set of text-books and illustrations have been supplied for schools, examination papers for different degrees of proficiency might be framed, and certificates given according to the attainments of the pupils, who upon entering an industrial college could at once take his place according to the grade thus indicated.

"It may seem an innovation to grant diplomas to common school-boys, but I can see no rational objection to it, and many great advantages. It would afford an honourable object of ambition, and stimulus to exertion, without the objectionable tendencies of place taking and prizes, where one pupil gets up by putting another down, and thus generating bad feeling.

"Certificates, I think, would be sufficient for school-children; or if prizes were awarded, they should consist of privileges of free admission, or admission at reduced fees to the industrial college.

"In order to carry out this relation of the elementary school to the industrial college, it would be necessary of course to frame the text-books of the former, in direct reference to the courses of instruction at the latter, and introductory to them; so that together they should form a comprehensive whole.

"Besides the text-books for the pupils in the elementary schools, teachers' manuals would be required, in which the matter of the text-book should be more amply detailed, and full instruction given for teaching and using the diagrams, models, &c.

"This is absolutely necessary, as such subjects are new to most teachers. It would be very desirable to establish classes for training treachers, both for those already engaged in schools, or pupil-teachers, on a similar principle to Mr. Hullah's music classes for teachers.

"I have presumed thus freely to make the above suggestions, believing that in doing so without reservation, and confining myself chiefly to my own department of education, I have acted in accordance with the request contained in your circular.

"I am, Sir," &c.

[2348.]

From Professor John Wilson, of Heath Lodge, Iver.

"To those who have observed the social and intellectual condition of the industrial classes on the Continent and compared it with our own, but little evidence is required to prove that our system of instruction is defective in principle and inferior in results. The Exhibition of 1851 furnished additional proofs of this, and forced conviction upon the minds of all thinking men.

"I quite believe with your Committee, that the great want of the day is a thorough system of industrial instruction, not merely for the middle classes, but adapted also to the requirements of that class more directly dependent on their individual exertions; and that to obtain this, we must seek to extend the curriculum of instruction both in our endowed grammar schools and in those of a proprietary nature. We must remodel our mechanics' institutes and increase their functions, and endeavour to obtain some public or honorary acknowledgment of the value of excellence by any class, and in any branch of the various sciences or arts taught.

"I look forward with grateful satisfaction to the great attempt about to be made by the Royal Commissioners, to elevate the intellectual condition of the people; my only anxiety is lest anticipation should be chilled by delay. Such a policy is at all times questionable, just now it appears to me vital.

"An antagonistic power is set up in emigration. In our Australian colonies, whither the great stream flows, the intellectual element is, and will be for some time to come, less valued than the physical; the ignorant are more successful than the skilled.

"This perception, flowing back to the source, is brought each day nearer to our shores, and sooner or later we shall, I fear, find it a serious obstacle in the path of that educational advance with which it is gratifying to know the Society of Arts so identifies itself.

"To meet this we must at once commence the work. Each day adds to our obstacles. Having admitted the principle of remedying this crying want, it becomes us to exert ourselves to carry it into execution, bearing in mind that it be based on those conditions so necessary for success — unity of action, self-government, and self-sustentation."

Z.

[2149.]

From the Rev. Foster Barham Zincke, M. A., of Wherstead, near Ipswich.

"Dear Sir,—In reply to your circular on the subject of industrial education, will you do me the favour of accepting the following few brief remarks?

"In attempting to urge their views upon government and the legislature, the friends of industrial education must be prepared to give a clear account of two things: first, to state distinctly what are their immediate and prospective aims; and, in the next place, to show distinctly in what way they propose to obtain these ends. There ought

to be no room for a misunderstanding about their objects, or about the steps they would take for promoting them.

"At the outset, then, I would suggest whether the term you employ is the most significant that could be used. In recommending a new system, and in applying it to others to aid in promoting it, the terms used are of importance. I would rather speak of *technical* than of industrial instruction; and would call the schools in which such instruction might be provided, technical schools. We are are not all of us familiar with the sense of the word industry, as a general term for any branch of trade or manufacture. Technical schools would readily convey the idea of schools in which were taught the *principles* upon which certain trades and manufactures rest; industrial schools would convey to the minds of most of us the idea of schools in which *habits*, rather than principles, were taught. Another objection to the term is, that it has become familiarised in many persons' minds with the attempts which have of late been made in many parts of the country to teach gardening to boys, and some of the duties of domestic female service to girls, at an age when the whole attention ought to be directed to primary and elementary instruction; by which mistake, what they will never afterwards have opportunities or time to acquire, is sacrificed to an attempt to anticipate a little of what they will learn in their first place of service. In fact, I have heard industrial schools, so called, recommended, on the express ground that they will break in the children of the poor to labour, and prevent their being over educated! I do not think it advisable, even though by so doing we might advance under the shelter of a term in common use, to call what we are advocating — Industrial Schools. I had rather even hear them called by the harsh-sounding name of *Arts'* Schools; but, as I have already stated, I prefer the designation of Technical Schools.

"I will suppose, then, that the technical instruction you are prepared to recommend, will be of three kinds: 1st, mechanical; 2nd, chemical; 3rd, such as may be of use in those arts and manufactures in which some æsthetical training is necessary; such, for instance, as carving in wood and stone, cabinet-making, working in glass and metals for the purposes of ornamentation, and generally those trades which are employed in producing work addressed to the eye, and requiring knowledge of the beautiful in form and colour: and that you will urge upon the Government, that in any educational measure which may be brought forward, provision should be made for instruction in these subjects. This, of course, will apply exclusively to schools established in towns. I am far from supposing that nothing of this kind can be done for those, the business of whose lives will be connected with the culture of the soil. There is much appropriate instruction for them respecting the physiology of plants and animals, on the chemistry of soils and manures, and in some departments of physics, all of which might be taught them quite as easily as anything they are now taught. But I think it better, as perhaps the Society of Arts does, to postpone the consideration of this.

"What means, then, will you be prepared to recommend for providing instruction upon the three branches I have just specified? I would advise that you should *begin* by urging forward, as much as possible, the effort which is now being made to introduce generally

into primary schools the practice of teaching drawing, without a knowledge of which a great part of the technical instruction you are desirous of establishing cannot be attempted. A knowledge of drawing is one of the primary or elementary parts of technical instruction. With the same view, I would recommend that in our elementary schools increased attention should be paid to geometry, and that, where possible, some notice should be taken of physics.

"This would make our elementary schools preparatory schools for those who might be afterwards desirous of availing themselves of opportunities for technical instruction, which the Legislature or educational societies may provide.

"I would, in the next place, recommend that means be provided in the metropolis and in some of our largest towns for teaching thoroughly the above-mentioned branches. If only two such schools could be established in London, and one in Manchester (though I hope to show how a great many more may be obtained), a great deal will have been effected. The great requisite will be able teachers. A few good names would at once bring such schools into notice. Perhaps it might be possible to obtain the aid of some men, even of eminence, by having recourse to the French system, which merely requires the professor, a man of great attainments and celebrity, to deliver before the class a certain course of lectures, and entrusts the whole detail of instruction, chiefly based upon the professor's lectures, to another class of teachers called repeaters (répétiteurs).

"Two such schools, one in London and one in Manchester, in which places might be found every facility for perfecting them, both as respect the number and character of pupils and of masters, might eventually become not only the models we now so much need, but even technical universities.

"It will never be possible to maintain schools of this kind except in large towns, on account of the number of masters they will require, who must be men of a certain degree of attainment, on account of the expense of laboratories and technological collections, and because that it will always be proper that the pupils should have opportunities, in manufactories and workshops, of inspecting the processes in the science of which they are receiving instruction.

"Will you now permit me to make a few remarks on the suggestions of the circular?

"I. You begin by drawing attention to our endowed grammar schools. It appears to me that the easiest and most effectual step towards their improvement would be the issuing by Government of a commission to inquire into the condition, revenue, &c. of all schools of this kind throughout the country. In the report a brief account of each endowment might be given separately, with a few remarks such as the case might call for, and some suggestions as to what, considering the amount of the endowment, the original design of the bequest, and the wants of the locality, ought to be the character of the school. In many places it would be found that an English school, supplying special instruction of a high character, was the thing most needed, and, after all, the times being considered, most in harmony with the intention of the endowment.

"The report should be accompanied with a map of each county

in which should be set down, in such a manner as would at once catch the eye, the locality, and amount of each endowment. The public would be astonished at their number, and in many cases at their value, and proportionably also astonished at the manner in which they had been neglected, at the very time, too, when such great exertions were being made everywhere to raise funds for educational purposes.

"The Commissioners might also be directed to point out localities in which smaller endowments, if aided by grants from the Educational Committee of Privy Council, might be made to support schools such as I have just mentioned. There can be no doubt but that in these ways a very considerable number of these schools might at once be obtained, to the great advantage of the localities in which they would be situated, and of the country generally.

"If the Committee were to consist of ten members, and the country were divided into five districts, each district might be assigned to two members of the commission, who would be required to act conjointly in making their inquiries, in order that each might be a check upon the other, and the whole work might be speedily and effectually completed in a very short time.

"The Cathedral and University Commissions afford precedent for, and almost make necessary, the commission I am recommending. Besides, an inquiry of this kind into our school endowments is an indispensable preliminary to any legislative settlement of the general question of education. Here are enormous funds existing for the very purpose for which Parliament is about to legislate. It would be therefore absurd to ignore them, and legislate upon the subject as if nothing of the kind existed. The manner in which they have been dilapidated and perverted, is notorious, and supplies another ground for the Commission.

"If anything of the kind I am recommending were done, it would of course imply the creation of a permanent commission of two or three members, who might be called the Commissioners of Endowed Schools, and whose duty it would be regularly to inspect these schools, see that no more abuses were allowed, and see that the proposed arrangements were properly carried out and maintained. With such a commission permanently established and responsible for the condition of our endowed schools, these schools might be made a great deal of; at all events, we should not again hear of school endowments being diverted to the relief of the poor-rate.

"You mention the connection between our grammar schools and universities. One potent reason why so many of our endowed schools in the towns, founded for the education of the townspeople, are now confining their attention to the old learning, will be found in the fact, that by so doing the master is enabled to attract to his school, as boarders, some of the children of the neighbouring gentry. These boarders render the school a very profitable concern to the master! their presence, however,—for fashion still enforces upon them a classical education,—renders the school incapable of providing a suitable education for the children of the townspeople. It becomes, henceforth, the object of such schools to prepare youths for the universities. But so far is this from being the kind of education wanted by the inhabit-

ants of the towns, that in many very considerable places, I could mention a county town in my own neighbourhood of 35,000 inhabitants, not a single person, with the exception of the clergy, received a university education. It is well known that of late years our towns, with the exception of such places as Cheltenham and Brighton, have been becoming more and more exclusively inhabited by persons in business and trade. However successful, therefore, these schools may be as places of classical education, and as feeders of the universities, it must be evident that, inasmuch as they are not giving what, in the present state of society, and in the present state of knowledge, would be the most suitable education to the children of the townspeople, they are virtually, to some extent, contravening the design of their foundation.

"II. Your second suggestion refers to mechanics' institutes. As far as my observation goes, I am not disposed to think that they can be made to any great extent to give the systematic and accurate training which I understand by the term technical education. These institutions are, and have been, of much value, but I think their main office, as far as this particular point is concerned, will be rather to spread an appreciation of this kind of knowledge than actually to teach it, as I should wish to see it taught. I prefer the special school.

"III. Proprietary schools or colleges will always teach what public opinion demands. Their reform, therefore, will follow, not precede, the enlightenment of public opinion, which will be most effectually enlightened by the success in life of those educated in special schools. I have endeavoured to show two or three ways in which some schools of this kind may be established.

"IV. A supply of suitable books, maps, models, diagrams, and apparatus, in a word of good technological collections, is absolutely necessary. I fear, however, that the cost of these things will always form an impediment to the establishment of such schools: but much may be done; and I would recommend that the Society of Arts should itself form a good technological collection for educational purposes, of which it would be always ready to supply a priced and descriptive list. This would be practically of much service.

"V. Systematic and defined courses will be necessary. The practical character, however, of this kind of education will impose the necessity of these courses being modified according to the wants of each locality. In a place, for instance, where there was much shipbuilding, especial attention should be paid to everything subsidiary to a perfect knowledge of the principles of naval construction. In the potteries in Birmingham, in Leeds, and in other large manufacturing towns, the courses would derive their character from the character of the staple manufactures of the place.

"VI. With respect to prizes, exhibitions, and scholarships, I would earnestly press upon the Society that it is not in them that the life of a school consists, but in the master. Whatever funds might be at my disposal I would devote to the object of securing as good a master as possible. These aids do not properly belong to our times, when any number of earnest students may be obtained for any study that will repay the labour bestowed upon it. They belong to a time when, schools and students being few, and books being dear, it was necessary,

by a system of bounties, to enable the children of poor parents to support the expense of a long education in distant schools and universities. Had it not been for them, there was a time when it would have been impossible to have supplied the Church with candidates for holy orders. Our estimate, however, of the value, under present circumstances, of these stimulants ought, I conceive, to be unfavourable. Oxford possesses them to a greater amount than any other institution in the world, and they are there sought after with much eagerness. But, on a large view, it does not appear that they ultimately contribute in any great degree to the forwarding of either of the two studies they were there designed to promote; for it is a very common complaint, and one that has now received the high concurrence of the Oxford University Commission, that neither scholarship nor divinity flourish at Oxford. A really good and useful school will never in these days want pupils; while scholarships will rather have a tendency, by fixing the thoughts of the pupils on irrelevant considerations, to damage its utility.

"VII. Examinations will be of great value if they are conducted by a *Board of permanent Examiners.* This will render possible and just a comparison between those examined in different places and in successive years. Besides, it requires, over and above a knowledge of the subject, some apprenticeship to make a good examiner. An examiner who has had little experience cannot distinguish between cram and knowledge, hardly indeed between knowledge and ignorance.

"VIII. The value of the certificates will entirely depend upon the character of the examiners. A certificate obtained from a permanent board of able examiners would be a high distinction, and of real value.

"I have been thus brief in my reply to the inquiries of your circular, because I have already treated these matters fully in my "Thoughts about the School of the Future," a copy of which I sent the Society of Arts last year, and in my other educational writings.

"Wishing the efforts of the Society in this cause every success,

"I am, Sir, &c.

"Foster Barham Zincke.

"Edward Solly, Esq., F.R.S."

This letter has been referred to at p. 5. of the Report.

Monsieur, Stoke on Trent, 12 Février 1853.

Ce n'est qu'aujourd'hui que j'ai le loisir de répondre à votre circulaire du 31 Janvier, pour vous soumettre mon opinion sur quelques uns des points sur lesquels vous cherchez à vous éclairer; je le fais en Français parce que je suis certain de rendre ainsi exactement ma pensée.

J'ai déjà eu occasion de soumettre quelques observations sur l'enseignement artistique à répandre parmi les classes laborieuses, aux deux éminentes personnes spécialement chargées du Département de Practical Art, et je laisserai de côté tout ce qui s'y rattache pour ne m'occuper spécialement que des moyens de populariser l'enseignement scientifique et industriel.

Si un rapide avancement dans les arts du dessin en Angleterre est pour quelque temps douteux, il n'en est pas de même de l'enseignement industriel, pour lequel l'esprit positif et le caractère calculateur des Anglais me semblent être admirablement préparés; et du moment que tout le monde aujourd'hui en comprend la nécessité, il faut faire une saine appréciation de ce qui est pratiquement faisable dans l'état actuel des choses sans chercher à bouleverser ce qui existe déjà.

Cet enseignement se divise en deux parties bien tranchées: 1° celui à donner aux ouvriers et aux artistes (qui lui-même se subdivise en enseignement *général* et *professionnel*); 2° celui à donner aux jeunes gens qui doivent devenir maîtres, c'est-à-dire manufacturiers, constructeurs, ingénieurs, &c., &c. Entre ces deux grandes divisions il ne devrait pas y avoir de mélange; les premiers devront recevoir, sans déplacement et sans frais, une éducation tournée essentiellement vers la pratique; les seconds, au contraire, devront aller à leur frais chercher une instruction à la fois théorique et pratique à Londres, la seule ville où il soit possible de réunir un choix de professeurs émérites pour remplir le cadre d'un pareil enseignement. Je parlerai donc séparément de ces deux faces de la question.

En vous proposant d'améliorer l'éducation professionnelle de l'ouvrier, je vous approuve de n'avoir pas eu l'idée d'enlever une partie d'entre eux aux travaux de l'atelier pour les envoyer s'instruire dans une école spéciale d'arts et métiers. Pour tout observateur de ces matières rien ne peut être meilleur pour l'ouvrier que l'apprentissage dans l'atelier sous la surveillance paternelle du maître; il y est naturellement amené à perfectionner lui-même ses procédés, en même temps qu'il profite des améliorations réalisées par ses camarades; il suffit donc de venir en aide à son intelligence en l'initiant aux ressources que la science met à sa disposition. Il y a en France deux écoles spéciales d'arts et métiers pour les artisans, l'une à Châlons, l'autre à Aix; ces écoles n'ont donné jusqu'ici que des resultats douteux, par deux raisons: la première, c'est que les professeurs des diverses branches de métiers s'endorment dans leur professorat, et après un certain temps ne sont plus au courant des perfectionnements accomplis; la seconde, c'est que les élèves, ainsi tenus deux ou trois ans en dehors de l'atelier, perdent l'habitude du travail manuel, et par cela seul qu'ils ont été élevés dans une école spéciale ils en acquièrent une suffisance et un amour propre qui leur rend extrêmement pénible le retour à leur première condition. Marcher dans cette voie serait travailler à faire de mécontents et grossir les rangs des futurs chartistes ou socialistes.

Sous aucun prétexte un jeune homme ne doit être retiré de son atelier. S'il a une intelligence très supérieure, comptez sur le génie humain pour que, artiste ou ouvrier, il devienne un Rembrandt ou un Jacquard, si après son travail vous pouvez lui offrir le soir l'attrait d'une institution où il pourra cultiver son intelligence et son goût. C'est donc en créant des établissements semblables à celui du Conservatoire des Arts et Métiers de la Rue St.-Martin (Paris), que vous atteindrez votre but.

Mais, direz-vous, nous avons déjà une grande quantité de Mechanics Institutions ouvertes aux ouvriers où ils peuvent s'instruire et se perfectionner. Permettez-moi de vous dire, que telles qu'elles fonctionnent, elles ne peuvent

presque rien faire de bon. Gardez-les comme des *réunions morales* destinées à empêcher les jeunes gens à faire un pire usage de leur temps, mais ne pensez pas que des réunions où le souscripteurs sont constamment livrés à eux-mêmes, sans professeurs pour leur faire distinguer le bon du mauvais, où les lectures sont rares, données d'une manière incohérente, tantôt sur un sujet tantôt sur un autre, par des discoureurs de quatrième ordre, puissent être d'un avantage sérieux pour le pays.

Je sais que des institutions comme celles que je désire voir créer ne sont pas possible dans tous les districts, et je ne crois pas possible d'en établir plus de cinq à six dans les grandes villes d'Angleterre, par la raison simple que vous n'avez pas en pépinière une abondance de professeurs *préparés pour cet enseignement*. Du reste vous pourrez juger de ceci mieux que moi. J'ajoute seulement que le choix des professeurs *sera la vie ou la mort* de vos établissements s'ils ne sont pas choisis avec une grande impartialité, et si vous ne décidez pas par un très libéral salaire les hommes d'un mérite réel à entrer dans la carrière de l'enseignment; tout dépend de là. (Je suis convaincu que ce qui s'est le plus opposé au développement des écoles de dessin, après le système que vous appelez *self-supporting*, a été l'insuffisance des maîtres, non que je les crois mauvais peintre ou dessinateur, mais parce que la plupart ignorent les bonnes méthodes d'enseignment.) Croyez bien que pour l'objet qui nous occupe il n'est pas facile de trouver un professeur pour expliquer *clairement* à des jeunes ouvriers des matières telles que la géométrie descriptive, les lois de la physique, ou les élements de la statique ou de la dinamique, sans formules algébriques compliquées, qu'ils ne comprendraient pas. Si vous trouvez donc de bons professeurs, faites-leur *un pont d'or*, parce que ceux-là en formeront d'autres pour les écoles qui seront plus tard établies dans les comtés.

Un autre principe d'enseignement doit être dans la *division des cours*, afin que chaque maître ne professe que ce qu'il connaît réellement bien. Pour des cours tels que la fonderie des métaux, la construction des machines, la fabrication du verre, la céramique, la teinture des papiers et des étoffes, &c. &c., il faudra avoir recours à des *praticiens* instruits qui consentent à traiter dans un nombre déterminé de leçons l'art qui leur est familier.

Ce n'est donc qu'à Londres que vous pouvez espérer de créer, dans un bref delai, un conservatoire des arts et manufactures aussi complet qu'il le faut; vous ferez là les expériences que vous aurez à essayer, et ce n'est que plus tard que vous pourrez répandre dans les comtés des institutions semblables sur une moindre échelle. Mais l'expérience de Londres doit être faite sous peu; il y a urgence, et il ne faudrait pas attendre d'avoir bâti un local, parce que les cours pourraient être faits provisoirement dans des amphithéatres déjà existants, afin de juger le mode d'enseignement des professeurs qui se présenteront.

Le Gouvernement aura sans doute à intervenir pour fournir ces conservatoires de bibliothèques et de collections, qui seraient placés sous la responsabilité des maîtres. Compter, pour pourvoir ces établissements des objets nécessaires, sur la libéralité, serait faire un mauvais calcul; les libéralitées seront trop limitées, et fussent elles abondantes elles ne s'exerceraient pas, le plus souvent, avec le discernement nécessaire dans le choix des objets. Je suis convaincu que peu de personnes savent ce qui est réellement nécessaire de mettre sous les yeux des élèves de chaque district, soit pour les écoles de dessin, comme pour les futures écoles industrielles. On ne peut avoir de garanties à cet égard que dans un comité choisi parmi des personnes éclairées et d'un jugement sain, qui comprendront que les élèves doivent apprendre *autant* en visitant les collections qu'en écoutant les leçons du professeur.

Mes idées ne sont pas arrêtées sur la question des prix à distribuer comme encouragement. Excellents pour stimuler les artistes, sont-ils nécessaires dans les classes industrielles? Ces derniers élèves n'auront pas le temps suffisant pour effectuer dans le conservatoire un travail manuel. Peut-être vaudrait-il mieux ne rien reglémenter à cet égard, et laisser les jeunes gens, les hommes même, profiter librement de l'instruction que vous répandrez. Ne mettez pas

un homme de 40 ans à même de rougir, si un enfant de 15 ans, qui aura l'intelligence plus ouverte, remporte sur lui le prix désiré.

Comme je ne puis entrer ici dans aucun programme de cours, je termine mes observations générales en recommandant que l'enseignement industriel commence d'assez bas, parce que la majeure partie des ouvriers ou artistes qui devront suivre les cours des conservatoires ont à peine eu le temps d'apprendre à lire et à écrire avant d'entrer à l'atelier, et ne pourront vraisemblablement jouir des améliorations que vous introduirez dans les écoles élementaires et autres.

Je serai très court dans mes remarques sur ce qu'il y a à faire pour l'éducation industrielle de la classe élevée. Selon moi il faut seulement fonder à Londres une *école centrale* pareille à celle qui existe à Paris, destinée à former ce que nous appelons des *ingénieurs civils*. Cette école, tout-à-fait privée, est due à un homme d'intelligence qui s'est associé les meilleurs professeurs, et qui les a intéressés à son succès. Aussi cette institution qui est fort lucrative pour son fondateur, a été une vraie bénédiction pour la France, à qui depuis 24 ans elle a fourni plus de 1,500 sujets capables, qui se trouvent aujourd'hui à la tête de nos plus importantes manufactures, et qui n'ont pas peu contribué dans ces derniers temps aux progrès de l'industrie Française.

Une telle institution, si vous pouvez la voir fonder, ne pourra recevoir que des jeunes gens déjà préparés dans d'autres établissements. Il faut donc que dans ces derniers l'instruction des matières scientifiques y soit assez développé pour que l'élève en se présentant à l'école supérieure connaisse au moins la moitié des matières algébriques, le dessin linéaire et la géométrie descriptive, et la géométrie proprement ditte, *à fond*. Comme j'ai peu de connaissance de ce que l'on apprend en Angleterre dans les "Grammar Schools" et autres, je ne puis rien dire sur ce qu'il peut convenir de faire.

Telles sont mes observations générales sur ce que je crois immédiatement fesable. Si je puis vous fournir d'autres observations de détail je ferai de mon mieux pour vous répondre, et je vous prie d'agréer mes sincères salutations.

G. Arnoux.

[2465.]

From M. Bontemps.

Reservoir Road, Birmingham,
12 Février 1853.

Monsieur,

Puisque j'ai été jugé digne de recevoir la circulaire de la Société des Arts du 31 Janvier, je crois de mon devoir de vous soumettre la faible contribution de mes idées sur le but qui se propose la société, et je prends la liberté de vous les adresser en Français qui me fera mieux comprendre que de l'incorrect Anglais.

Le but de la Société des Arts est l'un des plus noble que l'on puisse se proposer d'atteindre, celui d'élever le niveau des connaissances, et principalement parmi les classes industrielles, et en conséquence, ce sont les hommes les plus éminents dans les arts, dans les sciences, dans l'industrie qui doivent être appelés à y concourir. Il s'agit d'initier les jeunes gens aux connaissances que peut embrasser une intelligence ordinaire, et dans les limites de l'application à leurs futures professions; c'est une œuvre très difficile, et je considère que de tels génies que les Herschell, les Faraday, les Brewster, les De la Bèche, les Wheatstone ne dérogeraient nullement en voulant bien coopérer à une telle œuvre; à ces savants la Société des Arts devrait demander des livres pour les écoles; de tels hommes rendront la science claire et attractive; tous les phénomènes naturels, les grandes lois physiques et chimiques deviendront familiers aux jeunes gens qui deviendront aptes à en faire les applications. Que la

Société des Arts se garde bien surtout de demander aux savants d'écrire des traités sur les sciences appliquées à l'industrie. De tels traités existent en assez grand nombre en France, plusieurs ont été faits par des savants du mérite le mieux reconnu, et, je dois le dire, ils ont généralement échoué en égarant leurs lecteurs par l'exposition de procédés incomplets, souvent inexacts, ou ayant cessé depuis longtemps d'être pratiqués.

La Société des Arts devra, je le pense, s'adresser de même aux manufacturiers les plus éminents pour les prier de faire des traités sur l'industrie qu'ils pratiquent ou qu'ils ont pratiquée. Plus un manufacturier sera haut placé, moins il craindra de *dévoiler* ses *secrets*, ses *procédés*. A notre époque le succès ne réside plus dans des *secrets;* chaque manufacturier sait assez exactment ce que font ses concurrents ; le secret véritable réside dans une gestion éclairée. Je suis donc persuadé que les manufacturiers les plus recommandables n'auront pas d'objection à faire des traités sur leur art, exposant son historique, ses progrès, son état actuel, et surtout les perfectionnements dont il est susceptible; c'est sur ce dernier point qu'il faut appeler l'attention des jeunes intelligences, là est l'élément de réussite et de fortune de l'avenir.

Mais il ne suffit pas de faire l'éducation scientifique et industrielle de la jeunesse, il faut former son goût, développer ses facultés artistiques; c'est en ce point que gît la plus grande difficulté du problème. L'Angleterre ne manque pas de savants du plus haut mérite, de manufacturiers de la plus grande habileté, d'ouvriers qui secondent ces derniers dans la solution du problème du *bon marché* qui rend le monde entier tributaire de son industrie ; mais comment donner une impulsion artiste à ces produits ? Où sont les maîtres qui donneront l'enseignement ? Sont-ce les architectes, les peintres, les sculpteurs ? Que produisent les premiers ? des constructions qui ne sont pas sans mérite, mais simplement des copies, des reminiscences des monuments des âges passées. Les peintres font des tableaux dont le haut prix peut quelquefois attester la valeur réelle, mais ils ne se sont pas préoccupés de l'application de leur art à l'industrie. Les sculpteurs s'efforçent de s'inspirer de l'antique, cherchant à rendre les beautés de la forme humaine, et ne s'occupent guère de profiler un vase ou tout autre instrument domestique. Où donc chercher des instituteurs pour la jeunesse ? Les Français, plus avancés à certains égards sous ce rapport, ont cependant grand besoin aussi d'imprimer un mouvement plus artistique à l'éducation. Je dirai donc que les instituteurs ne peuvent aujourd'hui se trouver que dans des exemples des temps passés, et des pays qui, inférieurs sous bien de rapports, nous sont infiniment supérieurs au point de vue de l'art. Enfin il faut prendre l'art partout où il se trouve. Il faut créer des musées, de modèles à l'usage des écoles ; là doivent se trouver réunis les beautés de l'art Grec, les trésors du moyen âge, et principalement du XIII^{e} siècle, qui dans ses monuments religieux nous offre des modèles si sublimes, au point de vue de la pensée, de la forme, de la couleur, on n'oubliera pas les merveilleuses fantaisies de la Renaissance; mais aussi, et c'est sur quoi j'insisterai, parce que c'est moins généralement senti, qu'on ne manque pas de recueillir les précieux produits des Orientaux, qui nous sont aujourd'hui si supérieurs principalement sous le rapport de l'entente des couleurs. Qu'on étudie, en les amplifiant, ces riches dessins de tapis, de châles, que nous nous efforçons de copier servilement, et dont leur riche imagination nous expédie sans cesse de nouveaux modèles ; que les jeunes élèves cherchent à se rendre compte en quoi tous ces vases de Chine laissent si loin au-dessous d'eux les produits les plus soignés des manufactures impériales, royales, ou autres, de notre Europe.

J'ajouterai enfin que la musique doit tenir aussi sa place dans l'éducation de la jeunesse, rendez-la sensible à l'harmonie ; les jeunes imaginations, développées encore par ce complément, se familiariseront plus facilement avec les chefs-d'œuvre de tous les âges, de tous les peuples, et parviendront non pas seulement à les copier, mais aussi à enfanter des productions nouvelles, à donner enfin au XIX^{e} siècle le cachet artistique dont il est totalement dépourvu.

En vous communiquant mes idées, Monsieur, j'ai à m'excuser de m'être trop éloigné du programme de vos questions ; mais j'ai pensé qu'elles seraient traitées par beaucoup d'hommes éminents bien plus compétents, et j'ai cru devoir me borner à vous soumettre mes idées sur le point seul de l'instruction dans les écoles. J'aurai du reste pour excuse mon vif désir que la Société atteigne au plus haut degré le noble but qu'elle se propose.

J'ai l'honneur d'être, avec une haute considération, Monsieur,

Votre très humble et obéissant serviteur,

BONTEMPS.

Edward Solly, Esq.

APPENDIX B.

SUPPLEMENTAL REPORT ON AGRICULTURAL INSTRUCTION.

ALTHOUGH the Industrial Instruction Committee of the Council of the Society of Arts did not contemplate, on their appointment, any inquiry into the question of industrial instruction, so far as relates to Agriculture, yet the importance of the subject has been so earnestly pressed upon their intention by several of their correspondents, that they feel this inquiry would be incomplete did it not embrace some reference to a question of such grave importance as improved agricultural instruction. The Committee feel the full force of Dr. Latham's remark: —

> "Although," says he, "the industrial condition of the rural districts has evidently commanded some portion of the Society's attention, the prominence given to the town institutions in the circular has a tendency to engender the notion that the manufacturers of corn and meat have been unduly subordinated to those of cotton, silk, &c.

To view industrial instruction simply as a manufacturer's question, would be to take a one-sided view of the subject. It is, we are prepared to say, quite as much the interest of those who are engaged in agriculture that sound and useful information, bearing on their occupation, should be widely disseminated. It is, on one ground, even more desirable, because farmers, and generally that large class employed in husbandry, have not, to an equal degree with those who live in large towns and cities, opportunities, by daily communication with their equals, to improve and to enlighten one another. The mind requires the friction of other minds: it rusts without it. In our opinion, suitable instruction is as much needed by the farmer as by the manufacturer; but, of course, of a different kind. Nothing should be more deprecated than any attempt to impose an uniform system of instruction on the country. "Unity of action" is a very different thing from uniformity of teaching. The former invigorates executive rule; the latter dwarfs intellectual training. This must be formally stated, to guard ourselves from misconception. Several of our correspondents in-

correctly assume that we advocate the latter most objectionable principle.

Unity of action is, indeed, a want severely felt, and by none so much as by those who, dealing practically with the question of education, are qualified duly to appreciate its pressing requirements. The Rev. W. J. Kennedy, one of Her Majesty's Inspectors of Schools, in his general report for the year 1850, says:—

"So distracted, indeed, are all the elements of popular education — and, if I am not travelling too far out of my sphere, I would add, so distracted are they in all departments of education, from national schools to the great public schools, and from training-schools to the universities—that I feel as if nothing thoroughly systematic and effective, nothing worthy of the sums expended and worthy of this great nation, would be accomplished till the whole business of education be methodically organized and adjusted under the responsible care of a Minister and Board of Public Instruction. At present there is an immense waste of force. The energy which is exerted, the money which is expended, is almost like the work of the Danaides or of Ixion; so wasted is it all, or so counteracted."

"Men's minds seem more prepared than I ever remember before, nay, even anxious, for some great development of the present meagre and tantalising state of popular education. It is felt that very much effort is made for a small result. The clergy make great sacrifices of money and time, and what is more, enact the harassing and humiliating part of "mendicant friars," (to use the expression of the vicar of a large parish in Lancashire,) in order to keep schools alive; and the higher and middle classes are annoyed by constant demands upon their purse in aid of schools about whose efficiency and permanency they entertain doubts. In short, school managers and other promoters of education begin to feel that theirs is a *strenua inertia:* much work and little result. They regard the present system as a stop-gap. All this has, I think, led in some places to a temporary lull in the active promotion of the present machinery of education; while men's eyes are cast about to discover a system of maintaining schools which shall be at once efficient and sound, vigorous and permanent."

Farmers, it is said, have a proverbial antipathy to innovation. It is, therefore, the more necessary that real and useful knowledge should be imparted in early youth, or it will never be learned at all. The establishment of agricultural schools is a step in the right direction. We must, however, guard against the inference that the expression of our hearty wishes for the success of such institutions implies any very sanguine hope of permanent success. The idea of "agricultural colleges" may be found buried in the dust of other old and long-forgotten projects. In his *Considerations for the promoting of Agriculture, and employing the Poor*, published in 1723, Lord Molesworth makes the following remarks, which contain the germ of most of what is now proposed to be done.

"As to agriculture, I would humbly propose that *a school for husbandry* should be established in every county, wherein a master, well skilled in agriculture, should teach at a fixed yearly salary; and that Tusser's old book of husbandry should be taught the boys to read, to copy, and get by heart; for which purpose it might be reprinted."

And again he observes: —

"According to the best observations, the proper time to infuse that useful part of natural philosophy called Husbandry is in the earlier stage of life, when there is curiosity and a thirst for knowledge. And, if practice here could be joined with theory, enjoying the open air exercise and activity agree well with the turn and cast of young people, not to mention a revolution of perpetual variety, which is engaging at their age."

But a far higher name may be appealed to. Milton (letter to S. Hartlib) not only recommended, but established a school, in which the science of agriculture was to bear a prominent part in his system of education. His pupils were to read the works of Cato, Varro, Columella, &c., the only authorities at the time on the science of agriculture. But the project, as our readers will anticipate, came to nothing. The dedication of the Sylva of Evelyn contains ideas very similar to those of Milton. Cowley, too, recommended that a college should be endowed at Oxford, and another at Cambridge, and that professors of husbandry should be appointed.

But the idea of improving agriculture only, developed by Milton, Lord Molesworth, and Evelyn, author of the Sylva, is only a partial view of industrial instruction. The idea of establishing an industrial university (*gymnasium mechanicum*) for the improvement of arts and manufactures unquestionably belongs to Sir William Petty, one of the founders of the Royal Society, and the lineal ancestor of the present Lord Lansdowne, who has thus an hereditary claim, as it were, to take an interest in the advancement of learning and education.

In 1648, Sir W. Petty published his *Advice for the Advancement of Learning**, in a letter to Samuel Hartlib, the correspondent of Milton. From this curious tract, so much in advance of its time, we make the following extracts: —

"As it would be more profitable to boys to spend ten or twelve years in the study of things than in a rabble of words, so it would be more easy and pleasant to them, as more suitable to the natural propensities we observe in them. For we see children to delight in drums, painted flags, making ships with paper, handling the tools of workmen, &c., by all which it is most evident that children do most naturally delight in things, and are most capable of learning them, having quick senses to receive them, and unpreoccupied memories to retain them." p. 13.

"All apprentices might learn the theory of their trades before they are bound to a master, and consequently may be exempted from the tædium of a seven years' bondage; and having spent but about three years with a master, may spend the other four in travelling to learn the perfection of their trades. For we question whether (if he should engage himself in such an endless labour) a man, by the bare light and instruction of the book, could attain to a dexterous practice of trade, whereunto hath been required seven years' *autopsia*." p. 11.

"So that before they are bound apprentices to any trade they may foreknow the good and the bad of it, and not spend seven years in repenting.

"In the next place, for the advancement of all mechanical arts and manufactures, we wish that there were erected a *gymnasium mechanicum* [industrial university], or college of tradesmen."

He proposes also:—

"That there be instituted literary work-houses, where children may be taught to do something towards their living, as to read and write.

"That the business of education be seriously studied and practised by the best and ablest persons.

"That all children above seven years old may be presented to this kind of education, none being excluded by reason of the poverty and inability of their parents; for hereby it hath come to pass that many are now holding the plough who might be made fit to steer the state.

"That all children, though of the highest rank, be taught in their minority limning and painting, botanics and gardening, chymistry, &c. &c."

But we need not to travel out of the records of our own Society for examples. To encourage the development of an improved agriculture, by means of bounties and honorary distinctions, was one of the principal objects for which the Society of Arts, Manufactures, and Commerce was founded, exactly one hundred years ago. On turning over the earlier volumes of the Society's Transactions, one is struck with the large sums expended by the Society in bounties for this purpose. The principle was erroneous, and it therefore failed. It encouraged men of ingenuity and leisure, but it did not elevate or interest the mass. Those prizes have now long been discontinued. A better and a more expansive principle is the growth of our own time.

It becomes proper to mention it is not to detract from originality, or to display research, that we have thus occasionally, in the course of our Report, referred to what has been projected, or attempted, in former times. Our object is very different. We desire to stamp this conviction on the minds of those who may read our Report, that little is now proposed to be done which has not often been proposed before;—that schools for industrial instruction, agricultural colleges, and naval seminaries, have often been proposed, and sometimes carried actually into effect. So long as the public took an interest in the subject, they succeeded: when the national attention took another direction they failed. Now, this is an important consideration. Those who have not carefully inquired into the subject will say, "Oh! the Great Exhibition has thoroughly aroused men's minds. People are beginning to take an interest in the cultivation of art and science. They are now at last convinced that these things ought be taught to youth. It is one of those discoveries in social science, of which our time has just reason to be proud. New schools and colleges for science will be started. Give the voluntary principle free scope, and we shall, no doubt, in time realise important results." To such it may be useful to know that some of our smallest and most worthless grammar schools have witnessed the birth, growth, maturity, and decay

* Reprinted in the Harl. Miscel. vol. vi.

of institutions, noble in conception and fair in promise, and still exist (we cannot say live), the exponents of a state of education which we trust will soon be reckoned among the things that have been.

It is, therefore, with feelings of unmixed satisfaction we view the systematic and judicious attempts which are now being made by the Commissioners of National Education in Ireland, to introduce into that country, on a permanent basis, suitable industrial training.

The necessity for an education of this kind has been forcibly and eloquently shown in an article published in the Journal of the Royal Agricultural Improvement Society of Ireland, for April, 1848, which we believe we are not mistaken in attributing to the pen of Sir Robert Kane, President of one of the Queen's colleges in Ireland.

"Before, however, the duties of society can be fulfilled in Ireland by those to whom our observations specially apply, it is imperative that the great obstacle to improvement, the general absence of practical industrial knowledge, should be removed. In Ireland, instruction must precede improvement, that is, if it be really wished that the improvement of the country should be for the advantage of its inhabitants — a postulate which, as we believe we are safe in assuming, we shall not place under discussion. The corner-stone of whatever social edifice is to be erected or preserved in Ireland, must be the practical instruction of the people; and we therefore believe that we require the aid of the Board of Education far more than of the Board of Works; and we further believe that for every shilling that any plan of practical instruction could cost in Ireland, there would be repaid to the state tenfold the sum in smaller charges for extra-police, national defences, and special commission trials.

"Looking to the peculiar circumstances under which Ireland has been placed, it must be universally admitted that her staple industry will be agriculture. Her soil is for the most part naturally highly fertile, and as yet little exhausted; her climate mild, and although to be carefully taken into account in the system of agriculture best to be employed, still, on the whole, highly favourable to agricultural operations. It would be exceedingly imprudent, and indeed wrong, to stimulate by any extraneous means attempts at manufacturing industry, in the almost total absence of those vast accessory powers and skill which favour the manufacturing system in the sister kingdom. The resources Ireland undoubtedly possesses for manufacturing industry will, by the natural growth of circumstances, come into play at the proper time. When industrial habits and ideas are more firmly established among the people; when enterprise, which now fearfully hides its head even from the most friendly view, becomes more self-reliant and more assured, not from the sheer insanity of speculation, but from the well-considered speculations of extended knowledge and experience; then we shall be able to compete with other manufacturing people: but for a long time the chief business of Ireland as a country will be agriculture, and the practical education for which we now specially seek is agricultural education.

"Upon this cardinal point, as we conceive, the entire organization of our National system of education ought to turn. It is absolutely a delusion to exhibit a sum total of half a million of children being educated, when in reality those poor children, after being so educated, are almost inevitably swept into the chaos of practical ignorance and consequent idleness which engulfs the country. So many per cent. of the lower classes know how to read and write; but how many per cent. of those classes can earn their bread? The

unfortunate little boys in Kerry, who found profitable employment for a time in calculating areas and sides for the Ordnance Surveyors, at a halfpenny a triangle, were again starved when that highly scientific commission was brought to a close; for although certainly well educated according to collegiate ideas, they were not trained to their proper trade. Every National school in Ireland should be an agricultural school if situated in a rural district, and an industrial school when in a large town. Every schoolmaster in Ireland, every functionary of education, should be impressed with and inculcate the one idea, that the gangrene of Irish society is absence of practical knowledge, and that the remedy which it is for them to apply consists in practical education and the formation of business habits."

The views thus ably expressed, are now very extensively acted upon. The result so far amply justifies the wisdom of the experiment. Agricultural Model Schools are now established in different parts of Ireland, with every fair prospect of ultimate success. The improved instruction given in them does not benefit those only to whom it is directly imparted. It percolates through a stratum of society which could scarcely be got at in any other way. We read in the valuable and interesting Report of Dr. Thomas Kirkpatrick, their Agricultural Inspector, given in the Appendix to the Seventeenth Report of the Commissioners for National Education in Ireland, in the words of one of the local Inspectors, Mr. W. Connor, p. 321.:—

"The agricultural pupils have invariably directed the attention of their parents and friends to our systems of culture and management of the different crops, and have prevailed upon them to act in accordance with our suggestions and example. Some have been wholly guided by our movements, others partially so, but all have done a little, and all are determined to do more. Our numerous visitors, particularly from that class most wished for—the small farmers—take a lively interest in the management of the establishment, candidly admitting the backwardness of their position, and generously purposing to strive towards the improvement of their condition the ensuing season. It is not for me to enter into the causes which retard the progress of rural industry. One thing I am convinced of, the majority of small farmers sink too much under their difficulties, and consider improvement on their part as insuperable. Unhappily their want of industrial education deprives them not a little of that hope, which gives the spur to industry and gladdens the prospect of reward. But there are many prominent instances where the lessons of industrial education have been studied, and have stimulated the humble efforts of the industrious poor, teaching them better modes of farming, and thus disseminating the happiness of prosperity with the blessings of education. I have been frequently called upon for advice in agricultural matters both by poor and rich, and I rejoice to say, as our acquaintance becomes cultivated, our friendship becomes the more appreciated and respected."

Another local Inspector, Mr. P. O'Hagan, reports:—

"They evince the greatest desire for such instruction, and take a pleasure in imparting to their parents and neighbours such hints respecting the errors of farming, which they had learned during their attendance on the agricultural class. Many instances are known, *even in this locality*, (where improvements in the general system of farm management had already made considerable progress, through the exertions of that truly great and good man, the late William Blacker, Esq.,) that the pupils attending the agricultural class in this school were the means of inducing their parents to adopt a more regular and correct system in the management of their farms, principally the house feeding

of their stock, and the collecting and preservation of manures, than they had hitherto been in the habit of practising."

Mr. James Moore, in his local Report, thus describes the Agricultural School Department in his district: —

"The Agricultural School continues to be well attended, and the pupils generally spare no exertion in obtaining a knowledge of the most useful portions of a literary and agricultural education. Besides obtaining a fair knowledge of the theory and practice of agriculture, and of the elementary principles of chemistry and geology, they receive instruction in reading, English grammar, arithmetic, mensuration, geometry, book-keeping, trigonometry, algebra, and the theory and practice of land-surveying and mapping. It requires at least three years' close application for a pupil of fair abilities to become properly acquainted with the various branches, so as to enable him efficiently to discharge the duties of the office he may afterwards be expected to fill. Six free scholarships founded by Lady Bunbury, Sussex, through Major Kennedy, the Patron, and six more by the Commissioners of National Education, have been of great use in stimulating to improvement young men of good talents, who, probably, would not have the means to continue their studies if such an institution were not open for them. They were formerly selected at a public examination held in Strabane, from the most efficient candidates presenting themselves from the several National Schools of the surrounding districts. The candidates must write well, and understand English grammar, arithmetic, mensuration, and the four first books of Euclid. They hold their scholarships only for one year, but are eligible to be re-appointed should they still continue to hold their superiority at the next examination. I have never known one of them to lose his place at such examination; for, after a year's training, they are more than a match for those with whom they come in competition. For the last two years the vacancies have been filled from among the most talented and deserving pupils attending the Agricultural School as boarders at their own expense. One year's education, if they be naturally smart, and attentive to their studies, enables them to compete successfully for these vacancies when they take place.

"They work six hours each day upon the farm (but in harvest the whole of the day is occupied in securing the crops), and six hours are devoted to literary instruction within doors."

But it may be said, these are witnesses biassed by interest, or constrained by power. We can, however, add to these the testimony of one whose evidence will have weight with the British public. The Hon. and Rev. Sidney Godolphin Osborne, in his *Gleanings in the West of Ireland*, writes as follows: —

"It will serve to give the reader some idea of the effort making to spread sound agricultural knowledge, if I now proceed to detail the result of my late visit to the Glasnevin Model Farm Establishment, near Dublin. This school is under Her Majesty's Commissioners of National Education in Ireland. I found some neat buildings in connection, with about 100 acres, more or less, of land; there were cattle sheds, with a certain amount of stock, piggeries, &c. The land was very heavily cropped, and farmed on the highest known principles, applicable to such an extent of soil. It is worked, I believe, entirely by the labour of the pupils, under the direction of a Mr. John Donaghy, the Agricultural Instructor and Superintendent.

"The young men here educated are received on certain rules of recommendation, from all parts of Ireland, to be qualified for the situations of land bailiffs, agricultural teachers in schools, practical instructors in the provinces, or as farmers on their own account. The day I visited the establishment,

there were forty-seven pupils in course of instruction. Before giving any account of the nature of the education afforded them, I will place before the reader their parentage, and their intended future occupations, from particulars kindly furnished at my desire.

Sons of Farmers - -	26
„ Tradesmen - -	7
„ Land Stewards -	6
„ Schoolmasters -	6
Son of a House Agent - -	1
„ Medical Man - -	1
	47

Intended Occupation.	
To be Land Stewards - -	43
„ farm on his own account -	1
„ teach Agriculture - -	3
	47

"After going over the land in cultivation, I saw the young men collected in the Class-room. They were put through a long examination in the practice and theory of Agriculture. They were questioned narrowly as to the nature and classification of soils; the theory and practice of draining; the economy, nature, and effect of manures, natural and artificial; the relative cost of particular courses of cropping; the theory of cropping; succession of crops, &c.; the organism of plants; their relative effect upon the soil; the application of chemistry to agriculture; the comparative cost of land worked as arable or pasture, &c. &c. They were, in fact, examined with some strictness as to their knowledge of all those subjects which form the staple of books on the science and practice of high farming. Many of them answered quickly and *understandingly;* they all gave evidence that fully as much pains were taken in the theoretical teaching, as in the practical. I looked at some of the themes they write on the subject of Agriculture; they were all directed to the same end, viz., teaching thoroughly all that is known on this interesting branch of knowledge.

"I at first doubted whether they could understand the scientific terms they so freely used. I therefore laid wait for an opportunity to test one of them, and, to my surprise, had a good plain definition of a term given, which I thought must have been as Hebrew to the youth who used it.

"They looked to me to be youths of just the right stamp for the purpose for which they were in training,—hardy, healthy, and homely. They have lately got an increase of land for the farm, and are about to put up a house and offices on a larger scale. I was much gratified with the time I spent at this establishment: I can see no bound to the good it is calculated to effect. In December, 1848, there were fifty agricultural schools in connection with the Commissioners of Education in Ireland. am afraid I forgot to inquire whether the pupils were chiefly Catholics or Protestants. I hope there are many of both religious professions, and have no doubt that the pupils of these establishments are not exclusively of any one religious denomination.

"Those only who have had an opportunity of observing the general nature of farming, as practised amongst the small holders in the west, can form any true idea of the value of this system of training young men to become teachers, and exhibitors of a very different practice."

To the same effect, an unbiassed traveller of high reputation, the Rev. Edward Hitchcock, President of the Amherst College, United States, an author well known in this country by his work on the Connexion between Geology and Religion, thus records his opinion,—an opinion the more valuable as coming from a man neither swayed by predilections nor tramelled by party necessities.

In the "Commissioners' Report, concerning an Agricultural

School," presented to the Legislature of the State of Massachusets, Professor Hitchcock, who visited the Glasnevin Establishment, in July, 1850, reports,

"The central and most important of the Model Agricultural schools, is situated at Glasnevin, in the suburbs of Dublin. Mr. Macdonald was kind enough to conduct me thither, and I had, consequently, a good opportunity for its examination. It is situated on a farm of 128 acres of good soil, and the present head teacher is Mr. Donaghy, to whom I feel under great obligations for the time and attention he devoted to satisfy my inquiries.

"This institution was established in 1838, and its grand object is to train up Teachers for other schools, several hundreds of whom have already been sent out, and are spreading the knowledge here gained in other parts of Ireland. The present number of pupils is about fifty ; but buildings are now in course of erection for 100. The pupils receive literary as well as agricultural instruction. The principal lectures are on practical as well as theoretic agriculture. The mornings as well as the evenings are devoted to study, but a large part of the day to labour. Most of the pupils, I should think, are above twenty years of age. It was vacation when I visited, yet some thirty or forty had remained to work on the farm, and I very thankfully accepted an invitation to listen to an examination of the young men in the studies they had been taught. More than twenty cheerfully came in from the field, and without changing their dress passed a very creditable examination upon the various principles of practical and theoretical agriculture, in connection with its associated sciences. I am sure that they cannot carry abroad such principles as they here presented, without doing immense benefit to impoverished Ireland.

"On the farm the principles taught in the schools are practically illustrated. I walked over the fields, and have never, in any country, seen crops as fine, taken as a whole, of wheat, oats, beans, flax, and potatoes. The oats would probably yield eighty bushels to the acre, and the potatoes bid fair to produce 700 bushels, the disease having not then shown itself. The pupils have access to a good agricultural library, but I saw no collections in Natural History, nor in any other department, indeed. The place, however, being only three miles from Dublin, the pupils can resort thither for instruction in Natural History and the inspection of specimens. There is a museum of economic geology there, which will, ere long, afford great facilities to pupils.

"The pupils at Glasnevin are selected by the Commissioners from the most talented and deserving young men in the various agricultural schools in the kingdom, so that here we might expect to find pupils of a high character. If they can succeed in extending the skill and productiveness exhibited in this Model Farm, throughout Ireland, I am confident we should hear no more of her population as starving."

In Dr. Kirkpatrick's annual report given in the Eighteenth Report of the Commissioners, one of the local inspectors says,

"I am happy to be enabled to report most favourably respecting the progress the pupils forming the "Industrial Class" have made both in their literary and agricultural studies since the class was established about a year since. The members of this class get one shilling per week as a premium for industrial and orderly habits, regular attendance, and proficiency in their literary and agricultural studies. This weekly payment has had the desired effect of accomplishing, in an eminent degree, all that was intended; and so regular have they been in their attendance, that I have had no reason to institute any fines for neglect in this respect, although three of these boys come from a distance of nearly two miles. They work two hours on each of the five days of the week, and three hours on Saturdays, at such employments on the farm as are suited to their respective ages and capacities. When

vacancies occur in the class, such are filled up by selecting the most eligible of the boys attending the Agricultural Class in the day school.

"To show that the industrial training of these boys does not in any degree interfere with their literary instruction, I may mention a fact which came under my notice a few days ago. At the half-yearly examination of the scholars attending the day school, which took place last week, those boys who obtained the most premiums for good answering in their respective classes were the members of the "Industrial Class." This result was very gratifying to me, inasmuch as it was very frequently stated by the parents that the industrial training of these boys would interfere with their literary progress at school. The late Lord Gosford and Mr. Blacker, who were very anxious to promote agricultural education, had frequently used their influence to introduce this system of industrial training into this school, but failed in doing so from the deep-rooted prejudice entertained by the parents against it. I feel, however, great pleasure in saying that this prejudice is now in a great measure removed; and I may state, that when vacancies occur in the class, the parents evince a lively interest in having their sons admitted. This, and several other instances equally satisfactory, which have come under my notice, prove that the formation of an "Industrial Class" in this school has been productive of the most satisfactory results.

Improvements in agricultural instruction have not been, however, confined to Ireland. They have been introduced into this country also, but very sparingly, and without systematic development. An example of the good that may be done in this direction has long been given in the Royal Schools, near Windsor, of which Professor Moseley, in his General Report for 1849, thus speaks:—

"The occupations of children of both sexes in town districts and in rural districts which have some staple manufacture, are, of course, different, but in all I have found the opinion to prevail, that the period when they first leave school is fraught with danger; that the seeds of profligacy are then sown, and the foundations of pauperism laid; and that nothing is more to be desired than that some educational supervision should be exercised over them during the period which intervenes before they enter upon a life of active labour, associated with some well-considered course of industrial training. With this view the attention of the friends of education has been much directed to industrial schools. Several such schools have been established in my district, and among them the Royal Schools in the Great Park at Windsor. Fifty boys and fifty girls are there instructed in various branches of useful knowledge, and trained to habits of industry.

"The school-buildings, which are most conveniently arranged, include a kitchen and a washhouse; and two and a-half acres of ground adjacent to them are set apart for a school-garden. The children are clothed by Her Majesty, and dine at the school.

It being understood to be Her Majesty's wish that the girls should be so trained in the school as to fit them for service, and to enable them to discharge in after-life the duties of wives and mothers, to the usual instruction in religious and secular knowledge a good deal of useful teaching in domestic economy is added. Besides making their own clothes and those of the boys, they do (assisted by one maid-servant) all the household work of the schools —the cleaning, cooking, washing, and baking.

It must be granted that agricultural schools based on true principles, and fitted to supply suitable instruction to those who are to cultivate the soil, have not hitherto been extensively or systematically established in this country.

How much training schools of industry can effect, even for the most hopeless and the most degraded, the experience of the *Committee of the United Industrial School of Edinburgh* clearly shows.

"The Committee began their operations with diffidence, and watched them with anxiety; but they are now able to appeal to the substantial fruits of the system in the diminution of the pauper class and the increase of the productive. They can appeal to the fact, as shown more fully in their detailed statement in Appendix (Table V.), that upwards of seventy of the boys trained by them are now chiefly, as respectable artisans, making from 11*s.* per week downwards. In fact, the progress of their operations during the five years of their existence, has cheered them in their task, by bringing them in contact with a new class of persons whose present career is connected with the most agreeable associations. At first they had to deal only with the ragged outcasts of the streets—now they have, on the other side, to deal with a body of well-clothed and well-to-do young tradesmen, whose visits would be a credit to any institution. In looking to this cheering and respectable class, it is almost painful to have to refer to the misery and degradation which form the qualifications for admission to the Institution, as having once constituted the condition of these now respectable young men—but duty to the original purposes of the Institution renders it necessary. It may be here said, however, that the conduct of the pupils themselves has given eminent satisfaction. With very few exceptions they have given a hearty helping hand in their own elevation. The effect of the energetic training they have been subjected to has generally been immediately visible in developing both the physical capacity and the moral desire for advancement. When trained for the proper time in the Institution, and transferred to a suitable employer, it has scarcely happened, in any instance, that the boy has not confirmed the hopes of his patrons by being steady, honest, and active in his occupation. The Committee, in fact, have every reason to believe, what they could at first only hope, that under their training, and with the prospect which it affords, the pauper boy is in the general case permanently rescued from pauperism, and sent forth with a fair start in life among those productively industrious artisan classes who contribute so much to the sound moral strength, and to the substantial wealth of the British Empire.

"The Committee thus believe that, so far as human means can be spoken of as affecting such ends, their system has taken so many fellow beings who were likely to be a permanent burden on the country, and converted them into useful members of society. They beg earnestly to bring before the public the advantage of sustaining and strengthening such a system at a juncture like the present. The country is enjoying unusual prosperity; and it is at such a time of general strength and vitality that the opportunity should be taken of curing it of a disease, bad at all times, but especially terrible in times of trouble and adversity. Let it be remembered, that at times when the industrious and respectable portion of the people are going onward and rising in the world, the pauper class remain where they are. It is their nature to be unproductive, and they remain so. Those, who by vice, idleness, or—what is far more rare—some uncontrollable calamity, are brought into this position, are generally incurable. But fortunately this hopeless quality does not descend to their children. Brought up by such parents, or left rather as social savages in the streets, these children would, of course, grow up like their parents. No national progress in wealth would elevate or improve their condition: while in times of depression they would be a heavy and a dangerous burden. But that they can be raised, by proper management, into the productive, profitable, and respectable class, your *Committee have proved by facts.* Let us then, in our hour of prosperity,

endeavour to cure this social distemper, and be better prepared for the evil day, if it should come. We cannot, perhaps, entirely eradicate the social disease, but we can make a close approximation to its eradication. We can, in the persons of the young, take thousands of those who a few years hence would, if let alone, be burdensome and dangerous, and make them a credit and advantage to the country. It must be remembered, too, that if there ever could be a legitimate fear that the industrial training system would injure any class by creating too many skilled labourers, that fear is, at all events, at present groundless. Skilled labour of all kinds has, from the mingled effect of emigration and national prosperity, come into increasing demand, and there is every symptom that it will be more and more wanted." — *Fifth Annual Report of the United Industrial Schools of Edinburgh*, p. 4.

The subject of the improvement of agriculture, whether in its processes, or in the instruction necessary to a due appreciation of these processes, is one which the Society of Arts has, as it were, a prescriptive right to discuss. For the first half century of its existence it was in this country almost the sole promoter, on public grounds, of improvements in agriculture. That it did not in all cases follow the most judicious course to promote that development in the best direction, was not the fault of the Society but of the age.

(Signed) JAMES BOOTH,
Chairman and Reporter.

INDEX.

Aitkin, J., Birmingham, 4. 73.
Arnoux, G., Stoke-on-Trent, 4. 81.
Aberdeen M. I., 84.
Abingdon G. S., 86.
Allen, T., Liskeard, 86.
Atkinson, R., Dublin, 5. 87.

Babbage, Charles, London, 88.
Barlow, Rev. J., London, 96.
Barnsley M. I., 101.
Best, Hon. & Rev. S., Andover, 89.
Birmingham, Memorialists of, 14.
Bodmin G. S., 101.
Bolton M. I., 102.
Bompas, Dr. G., Bath, 93.
Bontemps, M., Birmingham, 91.
Brentwood G. S., 102.
Broadhead & Atkin, Sheffield, 5.
Brewster, Sir D., 11.
Brighton College, 98.
Bristol, Memorialists of, 15.
Brown University, Report of, 23. 64.
Brymbo M. I., 102.

Cambridge University Commission, 28.
Castles and Co., Bristol, 5.
Chambers, R., Edinburgh, 103.
Charley, W., Belfast, 5.
Chatham M. I., 113,
Chichester Cathedral School, 108.
Clay, Rev. J., Preston, 11.
Clay, J. T., Huddersfield, 110.
Clegg, T., Manchester, 112.
Commissioners of National Education in Ireland, Reports of, 61.
Coales, R., Northampton, 105.
Cocquiel, M. de, 14. 18, 19. 37.
Cole, Henry, 42.
Cook, Rev. F. G., H. M. I. of Schools, 48.
Cox, W. Sands, Birmingham, 11.
Crewkerne G. S., 114.
Crum, W., Glasgow, 5.

Davy, J., 115.
D'Israeli, Mr., 20.
Durham University, 36.

Edinburgh, School of Arts of, 55.
Ellis, W., Camberwell, 11.

Fairbairn, W., Manchester, 5.
Felkin, W., Nottingham, 5.
Fort, R., Lancashire, 5.
Fox, R. W., Falmouth, 120.

Gourlie, W., Glasgow, 6. 124.
Grantham G. S., 30.
Gray, Rev. H. F., Somerset, 126.
Green, Harry, Stoke-upon-Trent, 5. 127.
Greenhalgh and Sons, Notts, 5. 128.
Greenwich R. H. Schools, 57.
Griffith, Worcester Free Schools, 29.
Grove, W. R., 12. 128.

Halifax, Memorialists of, 15.
Harvey, A., Glasgow, 5.
Headlam, E., 12.
Henfrey, A., 131.
Hereford, the Dean of, 53.
Herschel, Sir J. F. W., 38.
Hick, J., Bolton, 6.
Hill, Rev. H., Warwick, 33.
Hill, Evans and Co., Worcester, 6.
Hitchcock, Professor, 221.
Hopkins, W., Cambridge, 51.
Horner, Leonard, 137.
Hull, Memorialists of, 16.
Humphrey, Rev. W. G., 52.

Iliff, Rev. Dr., Bishopwearmouth, 32.
Inman, Rev. J. W., Grantham, 30.

Jackson, Rev. T., Stoke Newington, 139.
Johnston, J., Durham, 36.
Jubb and Sons, Dewsbury, 7. 144.

Kane, Sir R., Dublin, 65.
Kennedy, Rev. Dr., Shrewsbury, 35. 182.
Kennedy, Rev. W. J., H. M. I. of Schools, 215.
Kidderminster G. S., 145.

Latham, R. G., 12.
Ledbury G. S., 150.

Liebig, the Baron, 46.
Lingen, R. R. W., 150.
Liverpool Collegiate Institution, 67.
Liverpool M. I. 67.
Long, Professor G., Brighton, 157.
Losh, Mr., 169.

Mac Clelland, Dr. J., Glasgow, 159.
Mair, A., Edinburgh, 116.
Mallet, H., Nottingham, 161.
Mechi, J. J., Kelvedon, Essex, 162.
Mercer, J., Oakenshaw, 163.
Merivale, Rev. C., 51.
Mills, R., 166.
Minton, H., Stoke-upon-Trent, 7.
Molesworth, Lord, 215.
Moseley, Rev. H., 12. 57.
Morell, J. B., H. M. I. of Schools, 50.
Mozley, Rev. T., 12.
Murray, Dr., Edinburgh. 56.

Napier, R., Glasgow, 7.
Nasmyth, J., Manchester, 170.
Nelson, Knowles and Co., Manchester, 8.
Newman, Professor, University College, 26.

Oldham, Memorialists of, 16.
Osler, A. F., Birmingham, 8.
Oxford University Report, 45.

Pattinson, H. L., Newcastle-on-Tyne, 8.
Peel, Sir Robert, 22. 40.
Petty, Sir William, 42. 216.
Phillips, Professor, York, 13.
Pillans, Professor, Edinburgh, 13.
Playfair, Dr. Lyon, 21.
Portlock, Lieut. Col., Woolwich, 175.
Power, Rev. A., Bath, Norwich, 177.

Renton, Rev. H., Edinburgh, 13.
Rigg, Rev. Arthur, Chester, 179.
Ripon M. I., 181.
Russell, Lord J., 21.
Russell, J., Birmingham, 8.

Schofield, A., 181.
Seymour, Lord, 21.
Sheffield, Memorialists of, 17.
Shelley, Sir J., 13.
Shrewsbury G. S., 35. 182.
Simpson, J., Edinburgh, 13.
Smith, R. Angus, Manchester, 186.
Spence, W., 188.
Steiner, M., 188.
Staffordshire Potteries, Memorialists of, 17.

Tennant, Rev. W., Westminster, 190.
Thorp, Ven. Archdeacon, Durham, 13.
Trevelyan, Sir W. C., Morpeth, 44. 144.
Turrell, H. S., Brighton, 191.
Tyldesley M. I., 191.
Tyndall, Dr. J., Queenwood, Hants, 192.

Warrington M. I., 193.
Warwick Athenæum, 193.
——— College, 194.
Waterhouse, J., Sheffield, 194.
Watkins, Rev. F., 53.
Watson, Hewett C., Thames Ditton, 196.
Whitehaven M. I., 197.
Williams, Secular School, Edinburgh, 198.
Wilson, J., Iver, Bucks, 202.
Windsor Royal Schools, 223.

Zincke, Rev. F., Wherstead, Ipswich, 203.

THE END.

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CLASSIFIED INDEX.

Agriculture and Rural Affairs.

Pages.

Bayldon On valuing Rents, &c. - 4
Caird's Letters on Agriculture - 6
Cecil's Stud Farm - - - 6
Loudon's Agriculture - - - 17
" Self-Instruction - - 17
" Lady's Country Compan. 17
Low's Elements of Agriculture - 18

Arts, Manufactures, and Architecture.

Addison's Temple Church - - 3
Bourne's Catechism of the Steam Engine - - - - - 5
" on the Screw Propeller - 5
Brande's Dictionary of Science, &c. 5
Cresy's Civil Engineering - - 7
Eastlake On Oil Painting - - 8
Gwilt's Encyclop. of Architecture 10
Jameson's Sacred and Legendary Art 13
Loudon's Rural Architecture - 17
Moseley's Engineering - - - 21
Steam Engine, by the Artisan Club 3
Tate on Strength of Materials - 29
Ure's Dictionary of Arts, &c. - 30

Biography.

Baines's Life of Baines - - 4
Bunsen's Hippolytus - - - 5
Foss's English Judges - - - 9
Freeman's Life of Kirby - - 9
Haydon's Autobiography, by Taylor 29
Holcroft's Memoirs - - 31
Holland's (Lord) Memoirs - - 11
Lardner's Cabinet Cyclopædia - 15
Maunder's Biographical Treasury - 19
Memoir of the Duke of Wellington 31
" Lord Peterborough - 23
Russell's Memoirs of Moore - - 21
Southey's Life of Wesley - - 28
" Life and Correspondence 27
Stephen's Ecclesiastical Biography 28
Taylor's Loyola - - - - 29
" Wesley - - - - - 29
Townsend's Eminent Judges - 30
Waterton's Autobiography & Essays 30

Books of General Utility.

Acton's Cookery - - - - 3
Black's Treatise on Brewing - - 4
Cabinet Gazetteer - - - - 6
" Lawyer - - - - 6
Hints on Etiquette - - - 11
Hudson's Executor's Guide - - 12
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Werne's African Wanderings - 31

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